

The Fetal Occiput Posterior Position: State of the Science and a New Perspective

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ABSTRACT: **Background:** *The fetal occiput posterior position poses challenges in every aspect of intrapartum care—prevention, diagnosis, correction, supportive care, labor management, and delivery. Maternal and newborn outcomes are often worse and both physical and psychological traumas are more common than with fetal occiput anterior positions. The purpose of this paper is to describe nine prevailing concepts that guide labor and birth management with an occiput posterior fetus, and summarize evidence to clarify the state of the science.* **Methods:** *A search was conducted of the databases of PubMed and the Cochrane Library. Additional valuable information was obtained from obstetric and midwifery textbooks, books and websites for the public, conversations with maternity care professionals, and years of experience as a doula.* **Results:** *Nine prevailing concepts are as follows: (1) prenatal maneuvers rotate the occiput posterior fetus to occiput anterior; (2) it is possible to detect the occiput posterior fetus prenatally; (3) a fetus who is occiput anterior at the onset of labor will remain in that position throughout labor; (4) back pain in labor is a reliable sign of an occiput posterior fetus; (5) the occiput posterior fetus can be identified during labor by digital vaginal examination; (6) an ultrasound scan is a reliable way to detect fetal position; (7) maternal positions facilitate rotation of the occiput posterior fetus; (8) epidural analgesia facilitates rotation; (9) manual rotation of the fetal head to occiput anterior improves the rate of occiput anterior deliveries. Concepts 1, 2, 3, 4, 5, and 8 have little scientific support whereas concepts 6, 7, and 9 are supported by promising evidence.* **Conclusions:** *Many current obstetric practices with respect to the occiput posterior position are unsatisfactory, resulting in failure to identify and correct the problem and thus contributing to high surgical delivery rates and traumatic births. The use of ultrasound examination to identify fetal position is a method that is far superior to other methods, and has the potential to improve outcomes. Research studies are needed to examine the efficacy of midwifery methods of identification, and the effect of promising methods to rotate the fetus (simple positional methods and digital or manual rotation). Based on the findings of this review, a practical approach to care is suggested. (BIRTH 37:1 March 2010)*

Key words: *arrest of labor, backpain in labor, fetal malposition, fetal rotation, Leopold's, occiput posterior*

The fetal occiput posterior position poses clinical challenges in every aspect of intrapartum care—prevention, diagnosis, correction, supportive care, labor management, and delivery of the fetus. The frequency of occiput posterior positions at the onset of labor ranges between 15 and 32 percent (1–5), but decreases to between 5 and 8 percent at delivery (4,6,7) and 13 percent in primi-

gravidas with epidural analgesia at delivery (4). Although the occiput posterior fetus usually rotates to occiput anterior eventually, it often occurs after many hours and efforts to deal with a painful, exhausting, and nonprogressing labor. The occiput posterior position is associated with prolonged first and second stages of labor, transfer of care from midwives or family

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physicians to obstetricians, and increased use of medical and surgical interventions to expedite labor and delivery, such as oxytocin augmentation, epidural analgesia, episiotomy, instrumental delivery, and cesarean delivery. The mother is at added risk for severe back pain, fatigue, discouragement, and in greater need for emotional support than a mother whose fetus is occiput anterior; she is also more likely to encounter complications, such as chorioamnionitis, excessive blood loss, third- and fourth-degree perineal lacerations, postpartum infection, and post-traumatic stress (6–8). If born in the occiput posterior position, the baby is at greater risk for 5-minute Apgar scores <7, acidemic cord blood gas concentrations, meconium-stained amniotic fluid, admission to neonatal intensive care, and longer hospitalization (5).

The obstetric “package” of epidural analgesia, labor augmentation, and instrumental or cesarean delivery has become a widespread but complex, risk-laden, and expensive solution to occiput posterior-related labor dystocia and arrest. It is clear that noninvasive methods to prevent, detect, and correct this position would reduce the use of medical and surgical interventions and improve physical and psychosocial outcomes for mother and baby. The ability to identify the occiput posterior fetus reliably would help to explain some problematic signs and symptoms in labor (e.g., back pain, delayed progress, and maternal exhaustion) and aid the selection and use of appropriate interventions (e.g., emotional support, maternal body positions, movements, palliative measures, followed as needed by synthetic oxytocin augmentation, artificial rupture of the membranes, epidural analgesia, manual rotation, and instrumental or cesarean delivery). In addition, the ability to identify fetal position accurately would allow the caregiver to assess the effectiveness of measures used to rotate the fetus.

A large body of empirical knowledge and advice has developed over many years from the hands-on observations and “common sense” of experienced experts. Much research on the occiput posterior position and related advice has been published in the past 15 years, and the evidence indicates that some common practices should continue and others should be discontinued, modified, or reexamined; many other practices remain unexplored scientifically.

The purpose of this paper is to explore some prevailing concepts that guide labor and birth management with an occiput posterior fetus, and summarize evidence to clarify the state of the science. Three areas are explored: prevention, diagnosis, and intrapartum correction of the occiput posterior position. The risks, benefits, and efficacy of midwifery, medical, and surgical management will not be reviewed.

After discussion of current research findings, a practical approach is proposed to care for women with a fetus in the occiput posterior position and its associated symp-

toms and complications. Throughout this paper, suggestions will indicate areas where further research would lead to a more comprehensive and successful approach to this common and troublesome problem.

Methods

Searches were conducted in databases of PubMed and the Cochrane Library, together with reference lists in selected papers and a hand search of papers in the author’s private library. The key words used in the searches included: *occiput posterior*, *occipitoposterior*, *fetal malposition*, *diagnosis*, *ultrasound*, *management*, *Leopold’s maneuvers*, *abdominal palpation*, *back pain*, *rotation*, *digital rotation*, *manual rotation*, *dystocia*, and *arrest of labor*. For usual advice and dogma on the topic, searches were conducted in midwifery, nursing, and obstetric journals, magazines, and textbooks; websites; and various childbirth books written for the public. Several prevailing concepts with respect to the occiput posterior position emerged from this body of literature, from personal conversations with maternity caregivers, and from the author’s long experience as a doula in a variety of birth settings.

Prevention of the Occiput Posterior Position

Prevailing concept no. 1

Prenatal maneuvers and positions rotate the fetus to an occiput transverse or occiput anterior position.

During late pregnancy, women are often advised to maintain particular positions and avoid others to encourage the fetus to rotate from an occiput posterior to occiput anterior position and to remain there during labor. According to the approach by Sutton and Scott called “Optimal Foetal Positioning” (9,10), the recommended maternal positions include variations of leaning forward while standing or sitting upright, and hands and knees. Avoidance of the following positions is recommended: deep squatting, sitting with legs crossed, semi-reclining, and supine. These recommendations are intended to use gravity and posture to encourage the occiput anterior position and good alignment between the fetal head and the pelvic inlet. Some midwives, chiropractors, and others also advocate a variety of other movements and activities to remove deterrents to the occiput anterior position caused by muscle tension or poor skeletal alignment, to improve posture and flexibility, and to relax soft tissue in the low back, trunk, and pelvis (11–13).

Relevant research findings. Few trials have investigated these recommended approaches. Although many

descriptive or anecdotal reports of success have been published, disappointing results also occur, even with highly motivated and compliant clients. Methodical scientific evaluation is warranted.

Two trials have investigated one of the most widely advocated techniques—the hands-and-knees posture. Andrews and Andrews studied 100 women of mixed parity at term, with a fetus in occiput posterior or occiput transverse, as determined by Leopold's maneuvers, a four-step method of abdominal palpation to assess fetal lie, presentation, position, engagement, and fetal weight (14). (See later discussion of reliability of Leopold's maneuvers in detecting fetal position.) Four groups of 20 women were assigned to hands-and-knees positions, combined with pelvic rocking, abdominal stroking, both pelvic rocking and abdominal stroking, or hands and knees only. A fifth group, the control group ($n = 20$) maintained a sitting posture. Each group maintained the position for 10 minutes, after which the position of each fetus was reevaluated with Leopold's maneuvers. Fetuses in 60 of the 80 in the combined hands-and-knees groups rotated; no fetus in the sitting group rotated. No follow-up investigation was conducted to ascertain whether the fetuses remained in occiput anterior after the study or reverted to their previous positions.

A second trial by Kariminia et al evaluated the effects of daily prenatal practice of the hands-and-knees position with pelvic rocking on the incidence of the occiput posterior position at birth (15). In this trial, 2,547 women at 37 weeks' gestation were randomly assigned to the intervention group (who were instructed to do pelvic rocking on hands and knees for 10 min twice a day from 37 wk until birth) or the control group (who were asked to go for a daily walk). No differences were reported in the incidence of occiput posterior position at delivery (8.1% in the intervention group vs. 7.8% in the control group), or in the need for instrumental delivery (incidence of transverse arrest was 3.4% in the intervention and 3.0% in the control groups). Adjustment for parity resulted in no differences between groups.

Application of findings. Neither of these trials demonstrated that brief prenatal interventions made a difference in fetal position during labor or at birth. Andrews and Andrews demonstrated that fetal position can be changed with hands and knees postures, but did not investigate whether the change could be maintained. Kariminia et al used a minor intervention (20 min/day of pelvic rocking in hands and knees), and concluded that pregnant women should not be advised to practice this position before birth. Another possible interpretation of this trial is that the intervention was so slight that it did not fairly test the potential value of pelvic rocking on hands and knees.

Diagnosis of the Fetal Occiput Posterior Position

Prevailing concept no. 2

It is possible to detect an occiput posterior fetus prenatally.

Usual methods of detection of fetal positions include the location on the mother's abdomen where fetal heart tones can best be heard; observation of a supine woman's abdominal contours (a "dip" in her belly below her umbilicus indicates an occiput posterior fetus); and Leopold's maneuvers.

Relevant research findings. No studies were found of the reliability and clinical usefulness of locating fetal heart tones to determine fetal position. In fact, one obstetric textbook states, "The location of fetal heart tones is not a reliable sign in determining how the baby is placed...." (16, p 162).

Observation of the abdominal contours is erratic, at best, and depends on the woman being lean, a normal amount of amniotic fluid, single fetus, fetal limbs being tucked out of the way, and other factors.

Two studies have evaluated Leopold's maneuvers to identify fetal position prenatally. McFarlin and Engstrom assessed 20 different clinicians' abilities to identify fetal presentation and position in 176 women at various times during pregnancy (41 of whom were at term; 17). The clinicians included 8 physicians, 5 certified nurse-midwives, 6 student-certified nurse-midwives, and 1 nurse practitioner. Assessments at term were 68 percent consistent with ultrasound examination. As one experienced midwife stated, "Clinicians are notoriously wrong in identifying fetal position from abdominal palpation" (18, p 191).

The second study evaluated a new modification of Leopold's maneuvers, which have not been improved or modified in the 110 years since they were introduced. Sharma developed modifications of Leopold's maneuvers that were intended to improve identification of fetal position and unusual lies (19). Although this retrospective study was not blinded or controlled, Sharma reports comparisons of Leopold's maneuvers and his own modified maneuvers with ultrasound findings (considered the gold standard) in 224 women at term. He reported that his maneuvers agreed with ultrasound in detecting the occiput posterior position in 96 percent of women, or 26 of the 27 occiput posterior cases, whereas Leopold's maneuvers detected 67 percent ($p = 0.0012$). This study introduced potentially valid improvements to an entrenched practice (i.e., Leopold's maneuvers), which itself was never proved to be helpful for determining fetal position. The practice is helpful, however, in determining fetal presentation, weight, and other characteristics (20,21).

Even if Leopold's or Sharma's maneuvers can be used accurately, they are only an assessment of the placement of the fetal spine, not the head. Through the use of ultrasound scans to confirm abdominal palpation, Peregrine et al found that the fetal head is often aligned differently within the pelvis than the fetal spines aligned within the uterus (22). In other words, the fetus can turn its head to right or left.

Application of findings. These techniques and many others fall into the category of the "art of midwifery," learned from one-on-one teaching, practice, mentorship, and experience. As is true of many techniques that comprise the "art" of midwifery or obstetrics, they have been studied rarely, and scientific validity of these diagnostic techniques has not been established. Sharma's technique merits serious investigation, especially as it may increase the accuracy of abdominal palpation. Many physicians and some midwives today give little importance to obtaining this information prenatally. The question is: Can outcomes be improved by identifying and correcting fetal position before labor?

Prevailing concept no. 3

A fetus in the occiput anterior position at the onset of labor will remain in that position throughout labor.

If this concept is true, it is highly desirable to make sure the fetus is in the occiput anterior position. If it is not true, perhaps it is less important to urge women to do everything possible to attain and maintain the fetal occiput anterior position before labor, as advised by Sutton and Scott (9,10).

Relevant research findings. Five studies of the progression of the fetus from onset of labor through descent have indicated that most fetuses that begin labor in an occiput posterior position rotate to occiput anterior during the first or the second stage. Only 8% to 30% that were occiput posterior at the onset of labor remained occiput posterior at birth. Conversely, approximately 30 to 40 percent of all babies born in an occiput posterior position were occiput anterior at the onset of labor (1,4,23–26). Lieberman et al assessed fetal position at three times in labor and at birth (4). They found that fetal position changes are common during labor. Of fetuses that were occiput posterior as late as 8 cm dilation, 80 percent turned to occiput anterior or occiput transverse by delivery, and of those that were occiput anterior at 8 cm, 5.4 percent turned to occiput posterior by delivery. When the authors compared fetal position at delivery in nulliparous labors with and without epidural analgesia, 12.9 percent of fetuses were occiput posterior in women with epidurals versus 3.3 percent in those without. The authors did

not mention if any low-technology interventions were used to rotate the occiput posterior fetuses.

Application of findings. The cited studies (1,4,23–25) were conducted under a variety of conditions that influence fetal position, such as, nulliparity versus mixed parity, induced versus spontaneous labor, use and nonuse of epidural analgesia, and others. Despite these variables, a conclusion shared by all these cited studies (1,4,23–25) is that the fetal position at the onset of labor is not predictive of fetal position at birth. It seems unlikely, therefore, that prenatal attempts to ensure an occiput anterior position at the onset of labor will improve the likelihood of that position at birth. (See later discussion of studies of intrapartum measures to maintain or attain an occiput anterior position during labor.)

Prevailing concept no. 4

Back pain in labor is a reliable sign of an occiput posterior position, and if prolonged labor is present in the absence of back pain, the occiput posterior position is not the reason for the delay.

The beliefs embodied in this concept are held by many caregivers, doulas, and childbirth educators. They form the basis for actions and advice to relieve the pain and rotate the fetus. Conversely, if the woman does not have back pain, the caregivers assume that the fetus is not occiput posterior and do not employ the fetus-rotating measures.

Relevant research findings. Only one study investigated the association between back pain and fetal position as determined by ultrasound examination (4). It was conducted in early labor (before 4 cm dilation). No difference was found in the incidence of reported back pain between women with occiput posterior fetuses (28%) and those with occiput anterior or occiput transverse fetuses (29%). However, a single study of early labor back pain does not tell the whole story, but it does indicate that location of pain is not a decisive criterion, as many assume.

Application of findings. Just as practitioners should not assume the presence of an occiput posterior position of the fetus in the presence of back pain, they should not rule out an occiput posterior position simply because the woman has no back pain, especially when labor progress is delayed. Delayed labor progress without back pain may still be the result of an occiput posterior position. Overlooking this possibility might prevent appropriate measures to reposition the fetus. Many positions and movements that are used to rotate an occiput posterior fetus are based on gravity and changes in pelvic

dimensions. These techniques provide more room within the mother's pelvis, and thus they may also help correct not only occiput posterior positions but also other malpositions, such as persistent asynclitism, face or brow presentations, and compound presentations (fetal head plus nuchal hand). Furthermore, if the caregiver has a clear idea of the direction of the fetal occiput (right, left, or direct), trial and error can be minimized when selecting appropriate asymmetrical positions (see next). However, maternal factors may also cause back pain, for example, the mother's pelvic shape, characteristics of her lumbar spine, previous injuries to her pelvic girdle or spine, postural abnormalities, and soft-tissue factors. The measures used to relieve back pain may help in such cases, although techniques to correct a fetal malposition may be irrelevant, exhausting, and discouraging. Measures for back pain include forward leaning positions and movement (27) baths (28), heat and cold (29), pressure and massage (29), hypnosis (30), acupuncture (30), transcutaneous electrical nerve stimulation (TENS; 31), and sterile water injections (32). It would be helpful for the practitioner to know the cause of the back pain to aid selection of the appropriate corrective measures.

Prevailing concept no. 5

The occiput posterior fetal position can be detected reliably during labor with digital vaginal examinations.

Accurate diagnosis of fetal position would allow the use of appropriate corrective actions, some of which are selected according to the direction of the fetal occiput. For example, if the fetus is right occiput posterior, the recommended action might be to lunge toward the woman's right, or to lie on her right side, or to lie in left Sims' position (semiprone, with upper leg flexed and resting on pillows; 33). Unreliable diagnoses would make it impossible to select the most appropriate of

these actions, or to evaluate whether those actions have been successful.

Relevant research findings. This concept has received considerably more research attention than the others discussed here. Studies of fetal position comparing ultrasound examinations with digital examinations were conducted during the first stage (Table 1; 3,23,26,34) and second stage (Table 2; 26,35–37). Two studies of second stage fetal position (38,39) compared both ultrasound and digital examinations with the actual position at delivery (Table 3). In all studies, high rates of disagreement occurred between ultrasound and digital examinations—higher during the first than the second stage.

In the aforescribed studies, ultrasound is generally considered to be the gold standard in determining fetal position. Authors of many of these studies recommend frequent or routine use of ultrasound to determine fetal position (3,26,36–39). Nevertheless, Lieberman et al reported rates of “uninterpretable” ultrasound examinations at admission, at 4 cm dilation, and at 8 cm dilation (4). Of a total of 4,054 ultrasonograms, 440 were uninterpretable, a rate of 10.8 percent. The rates were higher early in the study period than late, owing to the increasing experience of the sonologist who interpreted all of the scans. None of the published studies comparing digital vaginal examinations with transabdominal ultrasound examinations reported rates of uninterpretable findings. This result raises questions about how difficult it is to interpret ultrasound images of fetal position, especially for ordinary maternity practitioners (who will probably have less experience than the sonologist in the study by Lieberman et al; 4). Can ultrasound be considered the gold standard in determining fetal position? It is clear that, even with routine use of ultrasound to determine position in labor, some cases of occiput posterior position in the fetus will go undetected.

Table 1. Rates of Agreement Between Digital Examinations and Ultrasound to Diagnose Occiput Posterior Position During the First Stage of Labor

<i>Study</i>	<i>Number</i>	<i>Percent Impossible to Detect Any Position Digitally</i>	<i>Percent Agreement with Ultrasound (Within 45°)</i>	<i>Comments</i>
Sherer et al, 2002a (3), United States	102	Not mentioned	47	Attending physicians' findings more consistent with ultrasound than senior residents' ($p = 0.02$)
Akmal et al, 2002 (25), Finland	496	34	49	Obstetricians' findings more consistent with ultrasound than midwives' (50% vs 30%)
Souka et al, 2003 (26), Greece	148	61 ($n = 90$)	31	31% of the 58 in which position was assessed agreed with ultrasound
Nizard et al, 2009 (34), France, United States, Israel	87	Not mentioned	40	Stated that ultrasound assessments require “minimal ultrasound skill”

Application of findings. No study found that digital examinations produced clinically useful or reliable information on fetal position in either the first or the second stage. In fact, the digital examinations may do more harm than good; by missing many occiput posterior fetuses, the opportunity to intervene with noninvasive corrective measures may also be missed. One might wonder if some practitioners are more skilled in identifying fetal position than those who participated in these studies, for example, those for whom misdiagnosis may carry greater consequences. Midwives and doctors who advocate and care for women who prefer natural childbirth and those in out-of-hospital, remote, or underdeveloped settings with less access to medical and surgical interventions may be more skilled in low-technology methods of assessment. This question merits further study. If it were demonstrated that this group of practitioners was proficient in determining fetal position, this skill might be taught more widely and effectively. In the current absence of these skills, ultrasound examination is the most reliable method to identify fetal position. Most authors who performed the studies cited here advocate the use of ultrasound for this purpose (3,25,26,34–37). The rate of “uninterpretable” ultrasound images, described by Lieberman et al (4), begs further investiga-

tion, even though the rate they reported was lower than the rates of failed identification reported for digital examinations. Furthermore, “uninterpretable” images may cause less harm than “wrongly interpreted” images, because the latter may lead to false certainty and inappropriate actions.

Prevailing concept no. 6

Ultrasound examination is the only reliable method to detect fetal position.

Relevant research findings. The previous discussion of research findings when Leopold’s maneuvers, location of back pain, and digital vaginal examinations are compared with ultrasound examination indicates that the latter is scientifically demonstrated to be the most reliable method to detect fetal position.

Application of findings. Integrative holistic approaches advocated by experienced midwife authors (9–11, 13,30,40) that combine location of fetal heart tones, detailed and extensive use of Leopold’s maneuvers, mother’s reports of fetal movements and other assessments have not been subjected to well-designed

Table 2. Rates of Agreement Between Digital Examinations and Ultrasound to Diagnose Occiput Posterior Position During the Second Stage of Labor

<i>Study</i>	<i>Number</i>	<i>Percent Impossible to Detect Any Position Digitally</i>	<i>Percent Agreement with Ultrasound (Within 45°)</i>	<i>Comments</i>
Souka et al, 2003 (26), Greece	133	31 (n = 41)	66	66% of the 92 in which position was assessed agreed with ultrasound
Sherer et al, 2002b (35), United States	112	Not mentioned	39	
Depuis et al, 2005 (36), France	110	Not mentioned	80	Higher accuracy with occiput anterior fetuses; correctly identified only 50% of occiput posterior and occiput transverse fetuses
Akmal et al, 2003 (37), Finland	64	Not mentioned	27	Most (46%) errors were in occiput posterior group; only 17% were in the occiput anterior group

Table 3. Accuracy of Digital Examinations and Combined Vaginal/Perineal Ultrasound in Determining Fetal Position During Second Stage Compared with Actual Position at Delivery

<i>Study</i>	<i>Number</i>	<i>Percent Agreement of Digital Exam and Actual Position at Birth</i>	<i>Percent Agreement of Ultrasound and Actual Position at Birth</i>	<i>Comments</i>
Kreiser et al, 2001 (38), Israel	44	70	93	It is possible that some fetuses rotated between the time of assessment and birth
Chou et al, 2004 (39), United States	88	72	92	

trials. Many experienced midwives who are comfortable with low-technology care use these techniques with confidence. Studying their accuracy in detecting fetal position would reveal whether experienced and dedicated midwives who use a combination of these techniques are more effective in determining fetal position than those doctors, midwives, and students who participated in the existing studies and who varied in their expertise and experience. Such a study could determine whether dedication to the low-technology methods, good mentoring, and extensive practice results in reliable detection of fetal position.

It is reasonable to conclude from the current state of the science that the intrapartum use of ultrasound is the most reliable way to detect fetal position. One must, however, balance the tradeoffs with ultrasound—the potential risks (as yet unknown) of multiple brief exposures to ultrasound plus the costs of the equipment and staff training versus its potential benefits of reliable identification and timely selection and evaluation of low- and high-technology interventions. The other option is to study the reliability of low-cost manual techniques by the most skilled practitioners, and assess the feasibility of teaching and using them in all birth settings. The bottom line will be to demonstrate whether use of ultrasound, manual detection, or both improves outcomes.

Correction of the Occiput Posterior Position (Rotation of the Occiput Posterior Fetus)

Prevailing concept no. 7

Maternal positions and movements in labor facilitate rotation of the occiput posterior fetus.

Many positions and movements are advocated to rotate an occiput posterior fetus, such as side lying; leaning forward while standing, kneeling, or sitting; asymmetrical upright positions; squatting; walking; stair climbing; abdominal stroking or lifting; pelvic rocking; swaying while standing or sitting; lunging; crawling on all fours; and others (33).

Relevant research findings. Many studies have been published on the effects of maternal positions and movement during the first and second stages of labor. Two Cochrane reviews summarize their findings, some of which are indirectly relevant to the occiput posterior position (27,41). One review of 21 trials with a total of 3,706 women compared upright positions with recumbent positions during the first stage of labor and found that women randomized to upright positions who did not have epidural analgesia had shorter labors (by an average of 1 hr) and no increase

in negative effects (27). The second Cochrane Review of 20 trials with a total of 6,135 women compared upright or lateral positions with supine or lithotomy positions for length of second stage, assisted deliveries, and other outcomes. Upright or lateral positions were associated with decreased duration of second stage and a reduction in assisted deliveries, in addition to other benefits (41).

Only one study has specifically investigated the value of a single position—hands and knees—for turning the occiput posterior fetus during labor (42). This trial, by Stremmer et al, included 147 women, all of whose fetuses were occiput posterior as diagnosed with an ultrasound examination. They randomly allocated the women into two groups. Group 1 ($n = 70$) were assigned to spend at least 30 minutes on their hands and knees during a 60-minute period during active labor. Group 2 ($n = 77$) were assigned to remain in any position except hands and knees during the 60-minute period. An ultrasound scan indicated that 16 percent of fetuses in the hands-and-knees group and 7 percent in the control group had rotated to occiput anterior (not statistically significant). The hands-and-knees group had significantly less severe back pain. Satisfaction with hands and knees position was high, with 84 percent of respondents saying they would use the position in a future labor.

Application of findings. The shorter first and second stages for upright or nonsupine positions and movements reported in the Cochrane Reviews (27,41) may have been associated, in part, with a reduction in occiput posterior positions (although the trials did not specifically investigate the mechanisms associated with the shorter labors). Stremmer et al found promising although nonsignificant results from their brief 30-minute hands-and-knees intervention in occiput posterior labors (42). The results of this study may motivate others to investigate a more lengthy intervention or a series of interventions, like those described by Sutton (9,10), Simkin and Ancheta (33), Tully (11), Davis (43), El Halta (40), and others.

Prevailing concept no. 8

Epidural analgesia facilitates rotation of the occiput posterior fetus to occiput anterior.

This concept is based on the assumption that epidural-induced pain relief and relaxation of pelvic muscles will reduce resistance and facilitate rotation of the fetal head. In fact, the opposite has been found.

Relevant research findings. An association between epidural analgesia and instrumental delivery is well known (2,6,7,44), and may be due in part to the

following two epidural-caused phenomena: first, blocking the spurt of oxytocin that normally occurs in second stage and facilitates bearing-down efforts, and second, a decrease in pelvic floor muscle tone, which interferes with internal rotation of the fetus (45).

Lieberman et al's study of changes in fetal position during labor and its association with epidural analgesia found that the rate of occiput posterior position before epidural analgesia was given was the same in the group that later received an epidural as the group that did not receive an epidural (24% vs 26%; 4). At birth, however, the rate of occiput posterior position was almost four times higher in the epidural group (12.9% vs 3.3%, $p = 0.02$). This finding signifies that fetuses whose mothers do not receive an epidural are more likely to rotate spontaneously to occiput anterior.

Application of findings. It is not clear whether the reduction in maternal movement typical with an epidural contributes to fetal malposition. Usual management of a woman with an epidural includes a recumbent position, which she may maintain with little variation for hours—much longer than a woman without an epidural. In some settings, maternal change of position is not encouraged with epidural analgesia, except when warranted by nonreassuring fetal heart rate changes or a drop in maternal blood pressure. Studies are needed to compare fetal position at birth in women who frequently change position with women who do so only when medically indicated.

Prevailing concept no. 9

Digital or manual rotation of the fetal head to occiput anterior during labor improves the rate of occiput anterior deliveries.

If fetal occiput posterior position can be identified and corrected manually (with or without an epidural), it might spare the mother and baby from instrumental or cesarean delivery. Various techniques for digital or manual rotation are described in midwifery and obstetric textbooks (16,43,46). Digital rotation involves the practitioner inserting his or her fingertips against the fetal head and slightly lifting and rotating the head. Manual rotation is performed with the whole hand within the uterus or vagina, grasping the fetal head, and rotating it. These techniques are not widely used and require experience. They are considered safe (47; i.e., safer than instrumental delivery) by experienced proponents. Umbilical cord prolapse and fetal neck injuries are sometimes mentioned as concerns, but no specific studies of the incidence of these outcomes were found.

Relevant research findings. The small number of studies (none of which were randomized controlled trials) of

these techniques indicate a benefit from digital or manual rotation of the occiput posterior fetal head in increasing spontaneous deliveries and reducing cesarean and instrumental deliveries (48–50). One study by Shaffer et al compiled rates of successful rotation from occiput posterior or occiput transverse, and rates of cesarean birth after manual rotation (48). Successful rotation was defined as birth in the occiput anterior position. Of 742 women who underwent manual rotation, 74 percent delivered vaginally with the fetus in occiput anterior position. When the rotation failed, the cesarean section rate was 34 percent.

LeRay et al reported on 796 manual rotations that were attempted in their hospital during a 2-year study period, which represented approximately 16 percent of all the term singletons in cephalic presentation. They reported a 90 percent rate of successful rotations (49).

In their hospital, “manual rotation is routinely practiced by midwives and physicians” at 7 cm dilation or more, for indications such as no progress in dilation for at least 1 hour, fetal heart rate abnormalities in late first stage, or prophylactically to speed labor or avoid perineal damage. Detailed comparative analysis was performed for 147 patients: 68 failed rotations and 79 randomly selected successful controls. The authors found the following factors were associated with failed rotation: nulliparity; age >35 years; performing the rotation before complete dilation (three times more failures than when done after complete dilation); and performing it for a diagnosis of failure to progress (four times more failures than when used prophylactically). Prophylactic rotations were performed in 64 of the 147 patients. Their high rate of successful rotations may be partly due to the high skill level in an institution where it is performed frequently and also to the “prophylactic use” (i.e., without specific medical indication) of the procedure; in some latter cases, spontaneous rotation would surely have occurred.

A third study by Reichman et al included women at term, in second stage, whose babies were engaged in an occiput posterior position (50). This trial was a before-and-after comparison of medically indicated, not prophylactic rotations. The 30 women who delivered in the first 6 months of the study period and did not undergo digital rotation comprised group 1. In the second 6 months, 31 women (group 2) with ultrasound-confirmed occiput posterior diagnoses underwent digital or manual rotation. Group 2 had a 77 percent rate of spontaneous births, compared with 26 percent in group 1. Group 2 women were more likely than group 1 to give birth to occiput anterior babies (93% vs 15%) and less likely to have a cesarean section (0 vs 23%) or a vacuum-assisted birth (22% vs 50%). The level of statistical significance for all these differences was $p < 0.0001$.

Application of findings. Given these favorable findings for rotation of the occiput posterior fetus, it is unclear why few maternity care practitioners use this procedure. Although the rate of successful rotation depends on the experience and skill of the practitioner, and on whether it is used selectively or routinely, these cited studies (48–50) indicate that this technique would lower the rate of surgical delivery. Randomized trials are feasible and should be conducted to explore the safety and appropriateness of digital or manual rotation in the management of occiput posterior labors.

Proposed Management Approach for Labor with an Occiput Posterior Fetus

The following proposed approach to management of labor when an occiput posterior fetus is suspected or known is based on the current state of the science described in this paper (adapted from Ref. 33).

1. Do not try to put the baby into an occiput anterior position before labor.
2. Teach and encourage women and staff the movements, positions, and techniques to use in labor that change gravity influences and pelvic shape.
3. Provide space for laboring women to move and equipment to aid with positions and movement.
4. If the woman has back pain,
 - do not assume that the fetus is occiput posterior; many causes for back pain are possible;
 - confirm with ultrasound examination or another reliable method;
 - without ultrasound confirmation, consider other causes of back pain, and with trial and error, use measures listed next;
 - treat the woman's pain nonpharmacologically (continuous labor support, walking, abdominal lifting, ice, heat, massage and pressure, bath or shower, hands and knees and other forward leaning positions, TENS, and sterile water injections) and pharmacologically, if necessary;
 - provide epidural or systemic medications if requested.
5. If labor progress stalls, with or without back pain,
 - provide continuous labor support and encouragement;
 - assume fetal malposition and confirm position of baby with ultrasound or another reliable method;
 - treat nonpharmacologically and noninvasively, using ultrasound findings of fetal position to plan the direction of asymmetrical positions and movements (lunging, abdominal stroking, kneeling on one knee, side lying, and semi-prone positions) and assess the success of these measures;
6. The goals with this approach are to
 - if not using ultrasound, try all positions and movements and use trial and error with the asymmetrical actions, emphasizing those that feel better to the woman; look for improved progress in dilation or descent;
 - rotate the fetal head digitally or manually;
 - if these measures are not successful, use obstetric interventions.
6. The goals with this approach are to
 - help the woman tolerate her discomfort, slow progress, or both;
 - increase the rates of spontaneous vaginal births and decrease surgical deliveries;
 - decrease the physical and psychological trauma and poorer outcomes in mothers and babies that are associated with the occiput posterior position.

Discussion

The occiput posterior position and other fetal malpositions cause multiple challenges for both caregivers and laboring women. The inability to diagnose fetal position accurately is a serious deterrent to optimal care. Most caregivers are left guessing the fetal position because fetal heart tone location, Leopold's maneuvers, presence of back pain, and digital examinations are unreliable, according to existing studies. As shown in this paper, these assessments are wrong as often as they are correct. When the guess is wrong, potentially beneficial early interventions may be withheld, the wrong interventions, if any, may be selected, or the practitioner may immediately use interventions such as rupture of membranes, high doses of Pitocin, epidural analgesia, and surgical delivery. The ability to identify the occiput posterior fetus has the potential to reduce rates of numerous obstetric interventions and their associated risks, while improving physical and psychosocial outcomes.

Ultrasound, which has been the subject of numerous studies, appears to provide a viable solution to this frustrating and vexing problem. With training and access to portable ultrasound equipment, caregivers may use it as follows: first, as a training aid to develop manual assessment skills (by confirming accuracy of fetal heart tone location, abdominal palpation, or digital examinations); second, as a diagnostic method for fetal position; third, as a decision-making aid in selection of low- and high-technology interventions; and fourth, as an evaluation tool to assess success or failure of specific interventions.

Ultrasound scans should not be used frivolously. Although the precise risks of exposure are not known,

ultrasound clearly creates bioeffects and cannot be assumed to be risk free. If fetal position could be accurately identified in other equally accurate ways, they would be preferable. Those practitioners who have developed nontechnological approaches to this problem should be invited to participate in the development of trials of those approaches that would evaluate accuracy in diagnosis, effectiveness in improving outcomes, generalizability, and cost.

Conclusions

The state of the science indicates inadequate or little scientific support for many widespread practices and beliefs with respect to the management of fetal occiput posterior position and a failure to adopt other practices of potential value. Even if scientific studies suggest promising beneficial practices (ultrasound, digital or manual rotation, low-technology methods for correcting the occiput posterior position), they are largely disregarded. Currently, in many countries where obstetric outcomes, such as maternal and infant mortality, prematurity, and cesarean delivery rates, are no longer improving or are worsening, it is time to consider and use the available scientific findings in a different approach.

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