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Abstract
The benefits of maternal movement and position changes to facilitate labor progress have been discussed in the literature for decades. Recent routine interventions such as amniotomy, induction, fetal monitoring, and epidural anesthesia, as well as an increase in maternal obesity, have made position changes during labor challenging. The lack of maternal changes in position throughout labor can contribute to dystocia and increase the risk of cesarean births for failure to progress or descend. This article provides a historical review of the research findings related to the effects of maternal positioning on the labor process and uses six physiological principles as a framework to offer suggestions for maternal positioning both before and after epidural anesthesia.
Key Words Birth; Childbirth; Labor, first stage; Labor, second stage; Maternity nursing; Obstetrical nursing; Maternal postures; Maternal positioning.

Overcoming the Challenges: Maternal Movement

and Positioning
to Facilitate Labor Progress

For centuries laboring women chose to remain mobile and upright, using positions such as standing, sitting, kneeling, hands and knees, or squatting (Gupta & Nikodem, 2000; Johnson, Johnson, & Gupta, 1991). Today immobility throughout the labor process has become a common occurrence for many childbearing women. Increased medical management, obesity, lack of patient understanding about the importance of movement to facilitate labor progress, as well as lack of nursing understanding are all factors that have contributed to immobility. Amniotomy, oxytocin induction, fetal monitoring, and epidural anesthesia are interventions that can interfere with movement and position changes, necessitating immobility during labor. The increase in obesity seen in pregnant women can also be a factor, making it difficult for the woman to change positions and limiting the nurse's ability to maintain adequate fetal heart and uterine contraction tracings.

Because only 25% of women today attend childbirth classes (Declercq, Sakala, Corry, & Applebaum, 2006) the importance and benefits of position changes during labor to facilitate labor progress may not be well understood, and thus woman may not be motivated to move during labor. This author's observations over a 30-year time period in perinatal nursing is that it is not uncommon for a woman to remain in a semi-Fowler position in bed from the time she is admitted through most of her labor.

Decades of Research and Discussion

A review of the literature reveals that the influences of maternal position changes during labor and birth have been a continuing topic of interest and research over many years. Some of the outcome variables studied about the effects of maternal positioning in labor include

1. decreased maternal pain
2. facilitation of maternal–fetal circulation
3. quality of uterine contractions
4. decreased length of labor
5. facilitation of fetal descent
6. decreased perineal trauma and fewer episiotomies.

Decreased Maternal Pain

Research has shown that the ability to move and change positions during labor can decrease pain. Studies done over the past few decades, before the routine use of epidural anesthesia, found that women who were able to change positions regularly or maintain upright positions during labor were more comfortable and required less pain medication (Atwood, 1976; de Jong et al., 1997; Engelmann, 1977; Johnson et al., 1991). For instance, Adachi, Shimada, and Usul (2003) found in their study of 58 laboring women that a sitting position decreased labor pain in contrast with supine positioning. In a review of 21 studies with a total of 3706 women, Terry, Westcott, O'Shea, and Kelly (2006) found that the women who used upright positions were less likely to have epidural analgesia than women who remained recumbent.

Facilitation of Maternal–Fetal Circulation

It has long been known that a supine position during labor should be avoided to prevent maternal hypotension and decreased uteroplacental blood flow to the baby. Caldeyro-Barcia (1979) was the first to compare pH, pO_2 and pCO_2 in women who gave birth in the upright position versus those who gave birth in the supine position, finding higher values of pH and pO_2 and lower values of pCO_2 in cord blood in mothers who birthed in the upright position compared with those in a supine position. In addition, both Carbonne, Benachi, Leveque, Cabrol, and Papiernik (1996) and Nikolov et al. (2001) found that a supine position was deleterious and associated with a lower fetal oxygen saturation than the left lateral position. To avoid compression of the inferior vena cava by the weight of the uterus and baby, upright or side-lying positions are recommended to resolve or decrease variable or late decelerations and improve fetal oxygenation (Carbonne et al., 1996; Simpson, 2008; Simpson & James, 2005).

Quality of Uterine Contractions

A number of classic studies were done between the 1960s and 1980s to compare the quality of uterine contractions in different maternal positions (Johnson et al., 1991; McKay & Mahan, 1984; Roberts, Mendez-Bauer, & Wodell, 1983). Caldeyro-Barcia (1979) found that contractions were stronger but less frequent when the woman was positioned on her side than when on her back; contractions were strongest when the woman was standing. Similarly, Mendez-Bauer et al. (1975) found that contractions while standing had the highest efficiency in dilating the cervix; the next strongest position was sitting. The

Immobility during labor has become a common occurrence for many childbearing women.

gravitational advantage of an upright position, which places greater pressure from the fetal head against the cervix (10–35 mmHg of increased pressure), was theorized to be the reason for these findings.

Decreased Length of Labor

A number of studies have found that both first and second stages of labor were shorter for women who were upright, when compared with women who remained in a flat or semirecumbent position (Caldayro-Barcia, 1979; Johnson et al., 1991; Lawrence, Lewis, Hofmeyr, Dowswell, & Styles, 2009; Liu, 1989; Mendez-Bauer et al., 1975; Roberts et al., 1983; Terry et al., 2006). In Liu's study of 68 primigravidas, the first stage of labor for women in upright positions was shorter by an average of 66.48 minutes and the second stage of labor by 35.54 minutes. Caldayro-Barcia (1979) found labors to be 36% shorter when primiparas were in vertical positions.

Facilitation of Fetal Descent

Movement and position changes during labor have been often found to promote labor progress; upright positions have been found to be most beneficial. Immobility decreases the baby's ability to flex, engage into the pelvis, find the best fit, rotate, and descend. It has been suggested that midpelvic arrest and failure to descend can result in the need for forceps, vacuum extraction, or cesarean birth (Fenwick & Simkin, 1987; de Jong et al., 1997; Gupta & Nikodem, 2000; Johnson et al., 1991; Keirse et al., 2000; Roberts, Algert, Cameron, & Torvaldsen, 2005; Simkin, 2003; Simkin & Anchetta, 2005).

Decreased Perineal Trauma and Fewer Episiotomies

Data from studies have shown that women in squatting or upright sitting positions have fewer operative vaginal deliveries, fewer and less severe perineal lacerations, and fewer episiotomies than women giving birth in a semirecumbent position (Association of Women's Health, Obstetric, & Neonatal Nursing (AWHONN), 2008; Golay, Veda, & Sorger, 1993; de Jong et al., 1997; Downe, Gerrett, & Renfrew, 2004; Roberts et al., 2005). The lithotomy position, particularly when exaggerated with the thighs flexed up against the chest, is still preferred by many care providers, but the literature suggests that this position not only increases the risk of perineal lacerations but also increases lumbosacral spine and lower extremity nerve injuries and should not be used for pushing in the second stage of labor (Colachis, Pease, & Johnson, 1994; Tubridy & Redmond, 1996; Simpson, 2008; Wong et al., 2003).

Figure 1. Standing With Labor Ball to Promote "C-Curve" Position.

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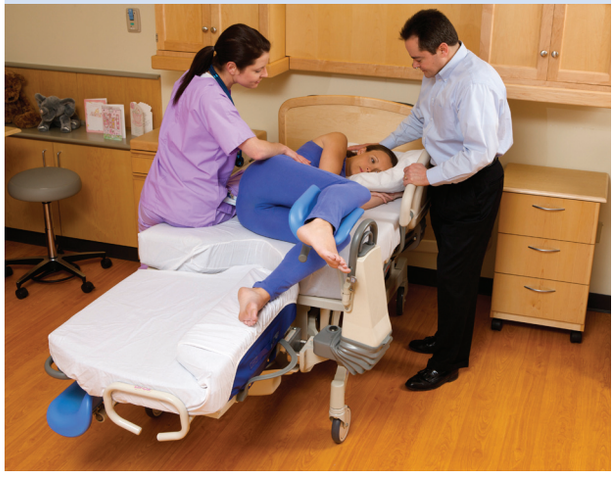
Figure 2. Side-Lying in Fetal Position to Facilitate "C Curve."



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Clinical Implications for Nurses: Implementing Maternal Position Changes During Labor

There are a number of strategies that can be used to provide movement and position changes throughout labor, despite the challenges that medical interventions, epidural anesthesia, or maternal obesity might present (AWHONN, 2008; Gilder, Mayberry, Gennaro, & Clemmens, 2002; Mayberry, Strange, Suplee, & Gennaro, 2003; McKay & Mahan, 1984). Six physiologic principles related to maternal positioning in labor were presented by Fenwick and Simkin (1987) as suggestions to facilitate labor progress and prevent dystocia. Although these principles were published over 20 years ago, they are still valid and provide a framework that nurses can use to facilitate movement and positioning for their patients, both before and after epidural administration.

A number of strategies can be used to provide movement and position changes throughout labor, despite the challenges that medical interventions, epidural anesthesia, or maternal obesity might present.

(a) Promote Spinal Flexion

Because of the forward pull on the abdomen from the weight of the uterus and baby, most women develop a natural spinal lordosis (an "S" curve) by the end of pregnancy. If the woman is placed in a supine or even semirecumbant position during labor, this exacerbates the lordosis, the pelvis is tilted back, and it is more difficult for the baby to engage into the pelvis, flex, and descend. To prevent this, the woman should be positioned with her back in a curled-forward "C"-curve position. This better aligns the uterus with the pelvis and the baby's presenting part with the pelvic inlet (Biancuzzo, 1993a; Fenwick & Simkin, 1987; Simkin & Anchetta, 2005). This "C"-curve positioning can be accomplished in several ways.

- When standing or walking before epidural administration, instruct the woman to round her back and lean forward during a contraction, either at the side of the bed using a labor ball (Figure 1), "slow dancing" with her labor partner, or against a wall.
- When in an upright position in a rocking chair or birthing bed, place pillows behind her head and shoulders to prevent her from arching her back; or encourage her to lean forward on pillows placed on an overbed table in front of her.
- When in a side-lying position, assist the woman to assume a fetal position ("C"-curve), rather than a side-lying position with an arched back ("S"-curve). (Figure 2).

(b) Promote an Increase in the Uterospinal (Pelvic) Drive Angle

When a woman is in a supine or semireclining position, her spine and uterus/baby are parallel; there is no angle between them. As a result, her contractions direct the baby toward the symphasis pubis and the anterior half of the pelvic inlet; because of the curve of the innominate bones as they meet at the symphasis, this is the smaller half of the inlet. If the baby is in a disadvantageous position (an extended or asynclitic head), it is more difficult for flexion and descent to occur. However, when the woman is helped into an upright position and encouraged to lean forward, her back assumes the "C" curve and gravity will cause the uterus/baby to fall forward in the abdomen. This creates an angle between her spine and the uterus. The contractions will then direct the baby toward the larger posterior half of the pelvic inlet, where there is more room to flex, rotate, and descend (Biancuzzo, 1993a; Fenwick & Simkin, 1987). When the woman sits upright in the birthing bed, this can be accomplished by using forward-leaning positions in several ways (McKay & Mahan, 1984; Simkin & Anchetta, 2005):

Figure 3. Sitting With Labor Partner to Promote "C Curve" and Increase Uterospinal Drive Angle.

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Figure 4. Sitting With Labor Ball to Promote "C Curve" and Increase Uterospinal Drive Angle.

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- Ask the woman's partner or family member to sit on the lowered foot section of the bed; she can then lean forward with her arms around him and rest her head on his back or shoulders (Figure 3).
- Place an overbed table with pillows on it in front of the woman so that she can lean forward.
- Place a birthing ball between the woman's legs on the lowered foot section of the bed and have her lean forward and hug the ball (Figure 4).
- Rotate one of these positions every 30 to 45 minutes with side lying.

Figure 5. Sitting Upright on Birthing Ball With Support of Labor Partner.

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Figure 6. Sitting Upright in "Throne" Position to Increase Gravity and Pelvic Outlet Diameters.

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(c) Facilitate Stronger Expulsive Forces

As discussed previously, upright positions increase gravity and can result in contractions being stronger, more efficient, and less painful in the first and second stages of labor. Upright positions can be incorporated intermittently throughout labor, both before and after epidural administration (Gilder et al., 2002; Mayberry et al., 2003; McKay & Mahan, 1984; Shermer & Raines, 1997; Simkin & Anchetta, 2005).

- Before the epidural, encourage the use of standing, walking, "slow dancing," a rocking chair, or a birthing ball (Figure 5).
- After the epidural, use the "throne position" in the birthing bed, with the woman sitting fully upright; lower the foot section of the bed to promote relaxation of her legs (Figure 6).

The challenges of today's technology should not prevent nurses from including frequent maternal position changes as part of their plan for nursing care and labor support.

(d) Promote a "Good Fit"

The mother's position influences the relationship between her pelvis and baby (AWHONN, 2008). Encouraging maternal positions that facilitate movement of the pelvis helps the baby find his best fit. Continuous movement gently "jiggles" the baby back and forth in the pelvis to help him flex, rotate, and descend (Fenwick & Simkin, 1987; McKay & Mahan, 1984; Simkin & Anchetta, 2005). Strategies to promote movement during labor include:

- Before the epidural, encourage ambulation, "slow dancing," pelvic rocking (standing and leaning forward at the side of the bed or in a side-lying position), sitting in a rocking chair, or sitting on a birthing ball (Figures 1 and 5).
- After the epidural has "set up" and a good fetal heart rate pattern and maternal vital signs have been established, begin a three-position rotation in the birthing bed every 30 to 45 minutes to help the baby find his best fit through the pelvis. For example, start the woman in a right side-lying position; then have her sit up in the "throne position," leaning forward with a "C"-curved back (in one of the ways described above and seen in Figures 3 and 4); then move her to a left side-lying position (Figure 2); then follow with the "throne position" and right–side-lying positions once again. This three-position rotation can be repeated throughout first and second stages of labor, as long as heart tones and vital signs remain within normal limits.

(e) Increase Pelvic Diameters

The influence of maternal hormones on pelvic mobility during pregnancy results in the ability to increase the anterior-posterior and transverse diameters of the pelvic outlet with the use of upright positioning during labor. Sitting on a firm surface (rocking chair, labor ball, or birthing bed) places pressure on the ischial tuberosities of the pelvis. This pressure results in lateral movement of the innominate bones, thus increasing the transverse diameter of the pelvis by as much as 30%. When the woman leans forward in a "C-curve" position, the sacrum and coccyx are free to move back, thus increasing the anterior-posterior diameter of the pelvis. This is also

Figure 7. Using a Side-Lying Lunge Position to Rotate an OP Presentation.

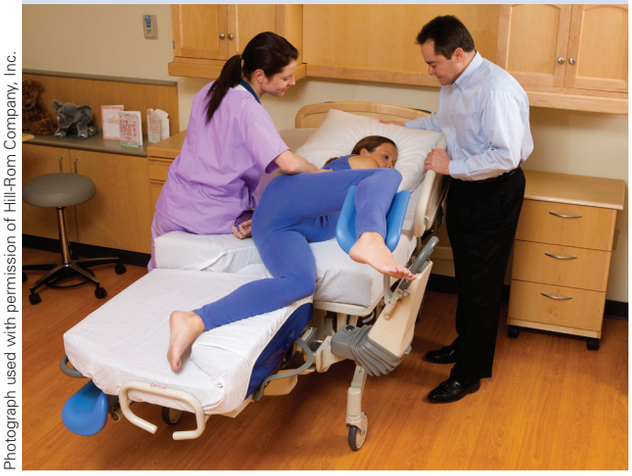

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Figure 8. "All-4's" Position to Facilitate Fetal Rotation.

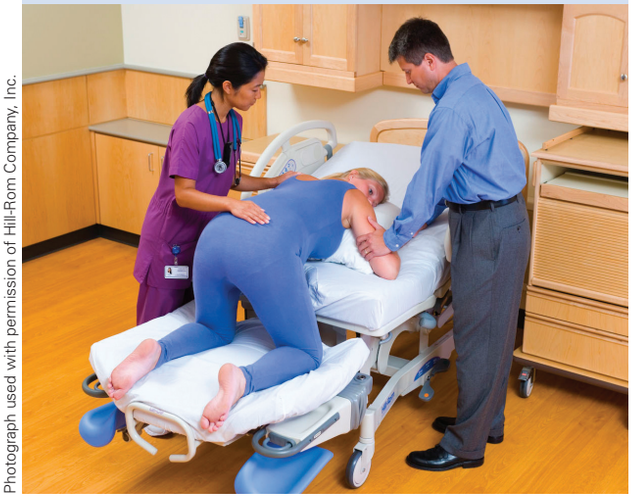

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Figure 9. Kneeling Over Back of Bed to Facilitate OP Rotation.

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facilitated when the woman is positioned on her side (Fenwick & Simkin, 1987).

These benefits can be facilitated in the following ways (McKay & Mahan, 1984; Simkin & Anchetta, 2005).

- When placing the woman in an upright "throne" or leaning-forward position in the birthing bed (Figures 3, 4, and 6), fill the air pillow in the seat to make it very firm, thus increasing the pressure on the ischial tuberosities to facilitate the described increase in the transverse diameter of the pelvis.
- When positioning the woman on her side, place her upper leg in the calf support of the birthing bed and raise it as high as is comfortable. When the upper leg is elevated as far away from the lower leg as possible, an increase in the transverse diameter of the pelvic outlet is facilitated (Figure 2).

(f) Facilitate Occiput Posterior Rotation

Frequent position changes (every 30-45 minutes) are a long-recognized strategy to facilitate the rotation of a baby from a posterior to an anterior position (Johnson et al., 1991; Ridley, 2007; Stremler et al., 2005; Stremler, Halpern, Weston, Yee, & Hodnett, 2009; Wu, Fan, & Wang, 2001). Suggestions for positioning to achieve this rotation include the following (Biancuzzo, 1993a, 1993b; Fenwick & Simkin, 1987; Simkin & Anchetta, 2005).

When using a side-lying (Sim's) position, place the woman on the same side as the baby's occiput; for example, if the baby is left occiput posterior (LOA), the woman should be placed on her left side. Slightly rotate her from straight side-lying (Figure 2) into a side-lying lunge position by placing her lower arm behind her and pulling the calf support out farther from the bed (Figure 7).

If the woman has not had epidural anesthesia, or if the epidural block is low-dose and allows for weight bearing on her knees, encourage her to assume a knee-chest or "all-4's" position. This can be done with her knees on the lowered foot section of the bed, leaning over pillows or a birthing ball (Figure 8), or with her knees on the seat section of the bed, leaning up over the back of the raised head of the bed (Figure 9). These positions decrease back pain and allow gravity to facilitate the baby's rotation. Pelvic rocking can also be done in these positions to facilitate rotation.

Summary

Studies have shown that maternal movement and position changes throughout labor can facilitate positive outcomes including decreased pain; good maternal–fetal circulation; decreased length of labor; enhanced fetal descent through the pelvis, thus facilitating labor progress; and decreased perineal trauma. Six physiologic principles can provide a framework for implementing beneficial position changes, both before and after epidural administration. The challenges of today's technology should not prevent nurses from including frequent maternal position changes as a part of their plan for nursing care and labor support. Nurses who care for women in labor can feel confident that they can have a major influence on

women's birth experiences by instructing them about positional changes for labor, helping women to select positions of comfort that can also facilitate labor progression and safe care (DeJonge & Lagro-Janssen, 2004). ✣

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The author is a consultant for Hill-Rom Company. LWW has identified and resolved any actual or potential conflicts of interest regarding this educational activity.

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www.childbirthconnection.org

The Lamaze Institute for Normal Birth
www.lamaze.org

Positions for Labor & Birth (illustrated handout from Simkin & Anchetta, *The Labor Progress Handbook*
www.transitiontoparenthood.com/ttp/parented/pain/positions.htm