Nursing Intervention to Change a Malpositioned Fetus

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A SCIENTIFICALLY BASED nursing intervention can facilitate the anterior rotation of a fetus in a posterior or transverse position. The use of specific maternal postures is a safe, simple, economic, and short-term nursing intervention. Maternal posture is the body position of a pregnant woman and includes maternal activities while in the position. Rotation to the optimal anterior fetal position can reduce the associated discomforts and clinical problems of malpositions. Fetal malposition (posterior and transverse positions) is frequently associated with prolonged and uncomfortable labor. Fetal position is the relationship of a particular point of the fetal presentation (cephalic, breech, and shoulder) to the front, back, or sides of the maternal pelvis.

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This article evaluates the relative effectiveness of a series of theory-based maternal postures for facilitating anterior fetal rotation. It is based on a study in which posturing was done with subjects at term gestation but prior to labor in order to control for numerous variables that could occur in labor. For the same theoretical reasons that anterior fetal rotation is anticipated with the specified maternal postures, when the subject assumes other postures, it is anticipated that the same or similar physical forces will facilitate a change in fetal position specific to the maternal posture. Posturing is expected to have a transient effect and with different maternal postures during pregnancy and labor, there will be reciprocal changes in fetal position.

CLINICAL SIGNIFICANCE OF FETAL MALPOSITION

The importance assigned to fetal malpositions varies in the literature and depends on when the determination is made in pregnancy and labor. However, these distinctions in incidence are not reported. As a result the reported incidence of posterior positions ranges from 10% to 30% of all vertex presentations.[1-7]

Prolonged labor and specific clinical problems are associated with posterior and transverse positions. Studies indicate that there are longer first and second stages of labor with posterior and transverse positions.[8,9] Clinical problems associated with posterior positions include fetal extension, slow dilatation, edema of the cervix, ineffective uterine action, infection, need for deep episiotomy during delivery, untoward effects on the fetus from prolonged labor, and subjective complaints of the parturient. These complaints include nagging pains in the suprapubic area and back, loss of sleep, irritability, and fatigue.[2-6,8,10-12] These clinical problems associated with the malposition are also linked to a higher incidence of maternal morbidity and an increase in perinatal mortality.[8,12,13] Finally, when the posterior position persists, the resulting clinical problems can lead to maternal and fetal exhaustion and morbidity unless intervention is initiated.[3-5,11]

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CLINICAL INTERVENTION FOR FETAL MALPOSITION

To avoid maternal and fetal morbidity or mortality as a sequela of malposition, anterior fetal rotation is generally desired. Fetal rotation is achieved by spontaneous rotation, artificial rotation, or maternal posturing.

Spontaneous rotation

Danforth speculated that 70% of fetuses in a posterior position will rotate spontaneously if given sufficient time and the remainder will require artificial rotation before the fetal head can advance.[11] Spontaneous delivery takes place after long anterior rotation to the anterior position or the less desirable short posterior rotation to the posterior position with a face-to-pubis delivery. Furthermore, only approximately one third of those persistent posterior positioned fetuses are able to deliver spontaneously.[12] This view of management of fetal malposition does not consider patient comfort during labor nor does it provide adequate guidelines as to when sufficient time ends and prolonged time begins.

Artificial rotation

Some authors advocate early diagnosis and careful observation and management while others indicate little concern because if the fetus fails to rotate, forceps can be used for this purpose. This latter view does not consider the potential hazards of operative interference involving manual or forceps rotation, deep episiotomy, and forceps extraction. The hazards are in the form of maternal morbidity (laceration of the vagina and cervix, rupture of the uterus, injury to the bladder or rectum, hemorrhage) and fetal morbidity (brain damage, intracranial hemorrhage, skull fracture, facial paralysis, cephalhematoma, bruising, cord compression).[5,12] Therefore even though forceps can be invaluable as a means of managing the difficult labor of a woman, they must be used with the knowledge of potential and harmful consequences. Another important consequence of operative intervention is that the meaningfulness of the experience is lost for the man and woman. Such intervention diverts attention from the excitement of birth. Moreover, the woman loses the opportunity to control her body in the completion of the birth process.[14]

Postural rotation

The supine posture is presently used in response to the demands of the accoucheur for observation, access, and monitoring of the fetus and the parturient woman. Similarly, in the eighteenth and nineteenth centuries authors reported that they derived benefit—benefit to the mother was not discussed—during slow, tedious labor, from putting the patient in various postures during labor (eg, lateral, standing, sitting, half-sitting, supine, genu-cubital).[15-21]

In this century a few writers have made occasional reference to the use of Sims posture to facilitate rotation.[1,4,10,22] Several authors recommend a knee-chest posture so that the heavier dorsal side of the fetus will rotate to the anterior.[1,23,24] Puddicomb investigated the knee-elbow posture during labor for the posture's effect on fetal rotation, and reported good results.[25] Andrews determined that the hands-and-knees posture was optimal for three reasons:[14]

1. The maternal abdomen and uterus are free from impingements (mattress, thighs, pelvis) that could indent or flatten the contour of the same. These impingements affecting the shape could hinder easy rotation of the fetus.

2. The uterus is less elongated and more oval in the hands-and-knees posture than in other postures; thus there is greater space between the maternal spine and abdominal wall for the fetal ovoid.

3. The hands-and-knees posture allows for a simple motion of rotation: in the knee-chest posture the heavy dense fetal head presses downward on the body producing a complex and more difficult rotation.

The hands-and-knees posture, with lower back arched to remove the impingement of the maternal sacrum on the uterus, allows the gravid uterus to assume its most complete oval shape in which the fetal ovoid can rotate.

Andrews found that short-term hands-and-knees postures significantly influenced fetal position.[14] The study was done at 36 weeks or more gestation but prior to labor. Because the postures had been expected to have an immediate but transient influence on fetal rotation, the need was projected for a series of studies to link maternal postures, fetal rotation or position, maternal comfort, and positive labor experiences. Furthermore, the findings in such studies could best be understood by identifying theories regarding the physical forces involved in order to explicate the mechanism of fetal rotation as a result of specified maternal postures. Therefore this study was designed to identify theories of physics as they applied to maternal posturing and evaluate the relative effectiveness of a series of maternal postures for facilitating anterior fetal rotation.

PHYSICAL THEORY AND MATERNAL POSTURES

Theories from physics and physiology provide an explanation for the mechanism of fetal rotation with the maternal hands-and-knees posture, alone or with pelvic rocking or stroking on the maternal abdomen. The use of gravity, buoyancy, and friction theories is based on the axiom that the fetal back is the heaviest and densest part of the fetal body with the exception of the fetal head.[26,27]

In a body, particles of matter are attracted by the earth, and the single force or weight of the body is the result of a large number of these forces of attraction.[28] Because fetal parts have various densities and weight, the gravitational forces are specific to the fetal parts. A body immersed in a fluid is buoyed with a force equal to the weight of the displaced fluid. The fluid exerts an upward force on the body.[28] When two forces of equal magnitude and opposite direction with the line of action parallel but not coinciding act on a body as a couple, there is a tendency for rotation.[28]

Hands-and-knees posture

When a gravid woman is placed in a hands-and-knees posture, the result is a fetal ovoid in a completely oval uterus surrounded by amniotic fluid. The heaviest part of the fetus, the back, is in a superior position to the other fetal parts. If gravitation and buoyancy forces are sufficient to produce a couple (two forces of equal magnitude and opposite direction with the line of action parallel but not coinciding), then the fetal body will rotate.[29] The heavier weight of the fetal back will be directed downward and the buoyancy forces will be directed upward, and because the two forces do not coincide, they will tend to cause rotation of the fetus.

Pelvic rock

Sliding friction refers to the force of opposition offered to the sliding of one surface over another.[28] If frictional force or an obstruction prevents rotation, the fetus is stable or in a state of equilibrium. When this occurs the pelvic rock exercise may reduce the frictional force or remove the obstruction to such a degree that the couple and therefore rotation will occur.[29] Doing the pelvic rock on hands and knees, the woman arches her lower back and then allows the lower back to relax and curve inward. She repeats the action slowly and rhythmically.

Stroking

If there is a significant frictional retarding force acting on the fetus, rotation can be achieved with a driving force greater than the frictional force.[29] A gentle, deep, but not heavy stroking motion on the side of the fetal small parts, from front to back, may exert a force against a part of the fetus and thereby create a rotational effect.

Consequently on the basis of the physical theories of gravity, buoyancy, and friction, four maternal postures were postulated as having specific forces operating to produce anterior fetal rotation:

1. The hands-and-knees posture with lower back arched (HK)—the couple of gravity and buoyancy.
2. The hands-and-knees posture combined with the pelvic rock (PR)—the couple of gravity and buoyancy and the inhibition of frictional or obstructional forces.
3. The hands-and-knees posture with self-stroking on the maternal abdomen from front to back on the side of the fetal small parts (ST)—the couple of gravity and buoyancy and a driving force.
4. The hands-and-knees posture combined with the pelvic rock and self-stroking on the maternal abdomen (Comb)—the couple of gravity and buoyancy, a driving force, and the inhibition of frictional or obstructional forces.

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The hypotheses are concerned with the effectiveness of the additional forces, either alone or in combination, or anterior fetal rotation.

1. Gravid women who maintain the hands-and-knees posture with the initiation of the pelvic rock will have a significantly greater proportion of anterior fetal rotations than gravid women who maintain the hands-and-knees posture (PR > HK).
2. Gravid women who maintain the hands-and-knees posture with the initiation of a stroking motion on the abdomen will have a significantly greater proportion of anterior fetal rotations than gravid women who maintain the hands-and-knees posture (ST > HK).
3. Gravid women who maintain the hands-and-knees posture with the initiation of the pelvic rock will not have a more significant difference in the proportions of anterior fetal rotations than gravid women who maintain the hands-and-knees posture with the initiation of a stroking motion on the abdomen (PR = ST).
4. Gravid women who maintain the hands-and-knees posture with the initiation of both the pelvic rock and a stroking motion on the abdomen will have a significantly greater proportion of anterior fetal rotations than gravid women who main-

tain the hands-and-knees posture with the initiation of the pelvic rock (Comb > PR).

5. Gravid women who maintain the hands-and-knees posture with the initiation of both the pelvic rock and a stroking motion on the abdomen will have a significantly greater proportion of anterior fetal rotations than gravid women who maintain the hands-and-knees posture with the initiation of a stroking motion on the abdomen (Comb > ST).

METHOD

Sample and sites

Thirty-nine healthy gravid women, both multiparas and primiparas of 38 or more weeks gestation with a fetus in a posterior or transverse position and who were not in labor, participated in the study. Exclusion criteria were previous cesarean section or uterine surgery (possible scar tissue could interfere with easy rotation), hydramnios or conditions associated with the same (a large amount of fluid could facilitate rotation), and multiple gestation or transverse lie (rotation would be difficult to determine).

Data were collected at two nurse-midwifery clinics, Simpson Center for Maternal Health in Springfield, Ohio, and St Louis University in St Louis, Missouri. At each data site 20 subjects were sequentially identified. After agreeing to participate in the study, they were randomly assigned to four treatment groups, five in each group in each setting. One subject was eliminated from the study because she did not fulfill the criteria for the treatment assigned: she giggled and as a result was not able to do the pelvic rock.

The investigator visited the data sites, explained the study, provided detailed guidelines for data collection, answered questions, and demonstrated the postures as needed. Telephone contacts were made during the study to keep track of the data collection and answer any questions.

Treatment groups

In the first posture group, subjects were postured on the floor on hands and knees with their lower back arched for a period of 10 minutes.

In group two subjects were postured on their hands and knees. Subjects did the pelvic rock slowly and rhythmically for 9½ minutes and then rested in the original posture for 30 seconds.

Subjects in group three were postured on their hands and knees with the lower back arched for a period of 10 minutes. During this period subjects used a gentle, deep, but not heavy stroking motion from front to back on the maternal abdomen on the side corresponding to the fetal small parts. Stroking was done slowly and rhythmically.

In group four the subjects were postured on hands and knees for 10 minutes. Subjects did the pelvic rock. With each pelvic rock, at the point when the lower back was arched, subjects did one gentle, deep but not heavy stroking motion from front to back on the maternal abdomen on the side corresponding to the fetal small parts. This combination of pelvic rock and stroking was continued for 9½ minutes followed by rest in the same posture for 30 seconds.

Measurement

The dependent variable, fetal position, was determined by Leopold maneuvers.

These maneuvers are a standard procedure for identifying fetal presentation and position in the care of gravid women by nurse-midwives. When fetal parts are palpated in a stepwise manner by a skilled practitioner, the results are comprehensive, accurate, and dependable, especially in the event of moving small parts.

Data collectors

At each data site three nurse-midwives assumed one of three roles: examiner, posture manipulator, or reliability midwife.

The examiner measured the dependent variable, namely, fetal position, with Leopold's maneuvers. This nurse-midwife was in the room with the subject only during the examination period, so she did not know what postures were done by the subjects. The first examination was done to identify the fetus as being in a posterior or transverse position. The second examination was done after the posturing to identify the fetal position. Scoring occurred with this second set of Leopold's maneuvers. From these results each subject was recorded as having rotated or not rotated. If the fetus remained in the same position the fetus did not rotate; if the fetus rotated from a posterior or transverse position to an anterior position or from a posterior to a transverse position, the fetus rotated anteriorly.

The posture manipulator postured the subjects, respective to the random assignment, for a period of 10 minutes in one of the four postures.

Before the study an interrater reliability was done between the reliability midwife and the examiner. At each data site these nurse-midwives separately assessed fetal position on each of 10 gravid women and had 90% and 100% agreement, respectively.

During the study a reliability measure was obtained on four randomly selected subjects. The reliability midwife separately assessed fetal position at the second abdominal examination. The percentages of agreement for this reliability were 83% and 92%, respectively. On the same four randomly selected subjects the reliability midwife also observed the manipulation of the independent variable, posturing, and judged the accuracy of the performance of the postures. There was 100% accuracy at both sites.

Procedures

Potential subjects were identified either during their regular prenatal visit by staff nurse-midwives or by the posture manipulator when reviewing patient records for specified criteria. The posture manipulator then explained the study to them and sought their participation. Those subjects who agreed participated in the study only once.

Each subject was examined to determine the fetal position. After the examiner left the room, the posture manipulator postured the subject according to the assigned treatment. The examiner then reentered the room and performed the second examination. If the fetal position was anterior, the subject was thanked for her participation. But if the fetus remained in a posterior position or rotated only as far as a transverse position, the subject was asked to do the combination posture for 10 minutes. This was done on an exploratory basis to see how well this particular posture might work when the other postures did not facilitate rotation to an anterior position in the first 10 minutes.

The combination posture had been the most effective posture for producing anterior rotation in an earlier study.[14] Following the second posturing the examiner performed a third set of Leopold's maneuvers.

Data analysis

The Fisher exact probability test was used to test the statistical hypotheses to determine whether the observed frequencies of rotations and nonrotations for each of the two posture groups being compared respective to each hypothesis could have occurred under the statistical null hypothesis. A chi-square and a simple one-way analysis of variance were used to examine relationships between rotation and other variables and to determine the homogeneity of the subsets of each posture group. A one-tailed test of significance was employed and an alpha level of .10 was established. This leniency in the rejection of the null hypothesis is appropriate for this particular research with the implied conception of the relative seriousness of type I to type II error recognized and accepted.

RESULTS

Sample

Pertinent descriptive characteristics of the gravid women in the sample are reported in Table 1. In addition, black subjects composed 56.4% of the sample; the remaining 43.6% were white. Thirty subjects were classified as having either an adequate or a gynecoid pelvis, and three subjects had a specific dimension of the pelvis reported as being narrow. There were no subjects with a breech presentation. There were 23 fetuses determined to be fixed in the maternal pelvis and 16 were ballotable. There were 35 fetuses with a flexed attitude and 3 with a military attitude.

Table 1. Measures of central tendency, standard deviations, and ranges of descriptive data (n = 39)

Variable	Mean	Standard deviation	Median	Mode	Range
Age (years)	20.95	4.72	19.38	18.0	16-36
Last delivery (years)	1.76	2.27	.80	.0	0-8
Estimated fetal weight (lbs)	7.32	.72	7.33	6.5	6-9
Subject's weight (lbs)	156.14	25.29	156.75	135.0	105-230
Weight gain (lbs)	31.57	10.20	31.25	26.0	9-57
Height (in)	63.82	2.37	64.13	66.0	59-67
Fundal height (cm)	36.74	2.70	36.58	35.0	31-44
Fetal heart rate	138.05	7.20	139.75	140.0	120-152
Torso (cm)	45.24	6.84	47.00	37.0	31-54

Table 2. Rotation frequencies in posture groups at the first posturing (n = 39)

	Posture groups				
	1 (HK)	2 (PR)	3 (ST)	4 (Comb)	Totals
Nonrotation	8	4	5	6	23
Rotation	2	5	5	4	16
Totals	10	9	10	10	39

Hypotheses

The rotation frequencies in each posture group are given in Table 2. In Table 3 each of the five hypotheses are designated by number and formula with the Fisher exact probability for each. Because the probability for the first, second, fourth, and fifth hypotheses was greater than .10, these hypotheses were not supported. The third hypothesis predicted no significant difference and was therefore supported. There is no statistically significant difference among the four posture groups.

There is no statistically significant difference among four posture groups.

Further data analysis

The data were examined for relationships between environmental, biographic, physiologic, and clinical obstetric variables and that of rotation. The frequencies of rotations and nonrotations at each of the data sites were recorded in Table 4. Significant differences at the first posturing between Springfield and St Louis were identified ($\chi^2 = 13.81$; $P = .0002$). It is apparent that Springfield had a larger number of anterior fetal rotations than did St Louis at the first posturing. However, the examiner in St Louis reported recognizing fetal rotations in subjects but following the guidelines for data collection did not record the rotations that were not all the way to the next fetal position or were not a full 45°. The same examiner also noted after the data collection that a greater number of fetuses in the posterior position, as opposed to the transverse position, rotated, though not necessarily far enough to the next position to be judged rotated.

There was no significant difference between data sites and identification of rotation at the second posturing. There was a slightly greater proportion of rotations at St Louis ($P = .42$) than Springfield ($P = .375$) at the second posturing.

The only characteristic of the gravid women found to be associated with rota-

Table 3. Hypotheses by formula and probabilities

Hypothesis	Fisher exact probability
1. PR > HK	.13
2. ST > HK	.17
3. PR = ST	.59
4. Comb > PR	.40
5. Comb > ST	.50

Table 4. Rotation frequencies at each data site (n = 39)

	Springfield	St Louis	Totals
First posturing			
Nonrotation	5	18	23
Rotation	14	2	16
Totals	19	20	39
Second posturing			
Nonrotation	5	11	16
Rotation	3	8	11
Totals	8	19	27

tion without being significantly related to data sites was the estimate of abdominal muscle tone. This estimate was made by the examiner when performing Leopold's maneuvers. The significant relationship is between tense abdominal muscles and nonrotation and between relaxed abdominal muscles and rotation ($\chi^2 = 13.02$; $P \geq .01$).

The occurrence of rotation and nonrotation and the various fetal positions is tabulated in Table 5 and will be explained in the clinical discussion. In general the subsets of posture groups were homogeneous as regards intervening variables.

Second posturing

Following the treatment posture and the second Leopold's maneuvers, 27 subjects performed a second posturing. This posture was the same as the fourth or combination posture. Of the 27 subjects involved in the second posturing, 11 experienced anterior fetal rotation.

DISCUSSION

The effects of the sample size, the power of the statistical tests, the large sampling variance, and measurement of lesser rotational movements may be related to the fact that four of the hypotheses were not supported and one was supported. Although these statistical considerations are important, both theoretical and clinical factors affecting the results have substantive value.

Theoretical discussion

The theoretical explication of how maternal postures effect fetal rotation remains sound, although additions to the theory are offered. The couple of buoyancy and gravity were effective in producing anterior fetal rotation in a number of cases in each of the posture groups. There were also cases when the couple did not work owing to friction or obstruction and the fetus was in equilibrium. At certain times the equilibrium was effectively disturbed by a rocking motion or pelvic rock or by a stroking motion or driving force, at which time the couple was allowed to work.

There is reason to believe that in some cases anterior fetal rotation is a gradual progression. One indication of progression is that the fetuses rotated from posterior to transverse, posterior to anterior, and transverse to anterior; the others did not rotate.

Table 5. Rotation frequencies with fetal positions for first and second posturings

	ROT	ROP	OP	LOP	LOT
First posturing (n = 39)					
Nonrotation	3	4	0	8	8
Rotation	4	7	1	4	0
Second posturing (n = 27)					
Nonrotation	4	0	0	3	9
Rotation	1	4	0	5	1

ROT, Right occipitotransverse; ROP, right occipitoposterior; OP, occipitoposterior; LOP, left occipitoposterior; LOT, left occipitotransverse.

Theoretical conditions influence the time factor in progression. The forces (gravity, buoyancy, friction, and obstruction) vary with each subject and each fetus. Because these forces are somewhat additive, when there is variation in the degree of forces, acceleration of rotation will vary in direct proportion. Also, as the fetus rotates, it turns to eliminate the couple.[30] Consequently, for fetuses who had slow acceleration to begin with, acceleration will slow even more between the transverse and anterior positions. Slowed acceleration will simply necessitate additional time for the fetus to reach the same goal as when faster acceleration of rotation occurs.[30] This could explain the rotation of fetuses at the second posturing.

There was a fault in the fourth and fifth hypotheses that was related to theory. These hypotheses essentially say that the combination posture with three forces (couple, inhibition of friction, and driving) are better than two forces with the pelvic rock (couple and inhibition of friction) or stroking (couple and driving). At any one moment there is not a greater number of forces acting in the combination posture than in the other postures. However, the combination posture may still be a more effective posture because when one force fails to facilitate rotation another force may be successful.

Tension of abdominal and uterine muscles was significantly related to rotation. When the uterine muscles are contracted, these muscle fibers shorten and can cause some degree of constriction around the fetus. Furthermore, when the uterus becomes a less pliable or a more rigid container, frictional force will be increased as the uterine wall increases its pressure against the fetus and retards rotational motion of the fetus. From this it is concluded that rotation may be more successful when muscle tension is reduced in the mother.

Clinical discussion

The incidences of posterior and transverse positions in this sample were not totally representative of the population. The right occipitoposterior (ROP) position is five times more common than the left occipitoposterior (LOP) position.[5] In this sample the LOP position was more common; the LOP position occurred 50% of the time, the ROP position occurred 46%, and the occipitoposterior (OP) position occurred 4% of the time. The left occipitotransverse (LOT) position is somewhat more frequent than the right occipitotransverse (ROT) position.[31] In this study the LOT position occurred eight times and the ROT position occurred seven times.

Reduced frequency of rotation in left-sided fetuses

The occurrence of rotation and nonrotation and the various fetal positions was tabulated in Table 5. It is possible to interpret these findings to mean that those fetuses with backs on the right side of the maternal pelvis are more likely to rotate than those on the left side. Fetuses on the left side were reluctant to rotate with the first treatment posture, but given time, the second posturing, more fetuses did rotate. It is clinically important to recognize that the second 10-minute period yielded a greater proportion of anterior rotations with fetuses positioned on the maternal left side. One reason is that the combination posture was the only posture used during this period. However, more important, the indications are that some fetuses, particularly left-sided ones, need more than 10 minutes to complete the rotation.

Because left-sided fetuses have slow acceleration regarding rotation, possible causes are explored. On the left side of the maternal abdomen, the colon or rectum could be an obstruction especially if the woman is constipated. Three subjects reported constipation at the time of the study and, interestingly, all three had fetuses on the maternal left side. Two were LOP and rotated to LOT; the other was LOT and did not rotate. Another consideration could be dextrorotation of the gravid uterus even though an explanation is not available as to how this organ adjustment could affect the amniotic sac, the amniotic fluid, and the fetus with regard to an effect on fetal rotation.

Although these two factors are considered, a more plausible explanation of the reduced frequency of rotation for fetuses in a left position may lie with the fetus. It has been determined that the heaviest, densest part of the full-term fetus, other than the head, is the back.[26,27] Moreover, the right side of the fetus may be the heavier side owing to the normally large liver of the full-term fetus. If this assumption is accepted, then consideration should be given to the right side of the fetus with a cephalic presentation when the gravid woman is in a prone posture; the right side is inferior to the fetal left side and so the heavier side is in a lower position.

Consequently there will be a slower acceleration than if the heavier side were in a superior position (a couple turns to eliminate itself), as would be the case with a fetus on the maternal right side. This slowed acceleration will necessitate additional time for the fetus to reach the same goal as when faster acceleration of rotation occurs.[30] Moreover, from the left transverse position the decreased rate of acceleration could slow the rotation so it would be infrequently seen in a onetime, 10-minute period of posturing.

Fetal flexion

On two occasions following the second posturing, one fetus in the LOT position and one in the ROT position had a change in attitude from military to flexed although there was no rotation noted.

Moreover, the head of the fetus in the LOT position also changed from being ballotable to fixed; the transverse position is the usual position for entering the pelvic inlet. Because there is an association of fetal extension with posterior position,[5,6] as the fetus rotates anteriorly allowing for greater fetal flexion, it is not surprising that the problem of fetal extension is resolved, which would in some cases allow for the fetus to enter the maternal pelvis.

Determination of which posture to use involves consideration of the individual mother, the fetus, the stage of labor, and the variables influencing fetal position.

Clinical differences in postures

The management of patients in labor determines when it is desirable for rotation to occur. Determination of which posture to use involves consideration of the individual mother, the fetus, the stage of labor, and the variables influencing fetal position. Although there was no statistically significant difference between the postures, clinical difference should be considered. Certain postures may be cumbersome to some patients and so may be least desired by a patient at a certain stage of labor. In this case another posture may be attempted. Also alterations of the combination posture can be made for ease and comfort of a parturient woman.

The results of this study are clinically significant owing to a resolution of some clinical concerns, the lack of adverse reactions other than subjects' being tired, and primarily because of the numbers of successful anterior fetal rotations. Specifically there were 16 anterior fetal rotations at the first posturing and 11 more at the second posturing; 26 subjects experienced anterior fetal rotation (one subject had fetal rotation at each posturing). At the end of the posturings, in 10 or 20 minutes, there were 10 anterior fetal positions, 5 of which had originally been posterior.

Maternal posturing involves no cost except time. It is easy because teaching and learning the postures are uncomplicated and straightforward and need minimal practice in most situations. Checking on the accuracy of performance is a simple task. It can be convenient because postures can be done at home to relieve the discomforts associated with a posterior fetal position and possibly, if done at an appropriate time, to encourage an anterior fetal position during labor. There are no known physiologic hazards.

In summary, the hands-and-knees postures are safe, simple, economic, and physiologic nursing interventions based in theory. When they are effective in producing anterior fetal rotation they are accompanied by patient comfort and capability.

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