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Clinical Implications From an Exploratory Study of Postural Management of Breech Presentation

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Abstract

The results from an exploratory study of the effectiveness of maternal knee-chest posture for producing cephalic version of breech presentation are shown. Methods are briefly described and clinical implications are presented. Among 25 women, fewer who performed the maternal knee-chest postural intervention experienced fetal cephalic version than women in the control group who did nothing to influence breech presentation. Despite limitations of the underpowered findings, trends in the data may indicate that parity and gestational age were potentially relevant covariates of version. Postural management is not an evidence-based practice. This exploratory study indicates that maternal knee-chest posture may work opposite to the expected direction, but the small sample size precludes generalizations about efficacy of knee-chest postural management. At least one adequately powered trial that controls for parity and gestational age is needed to determine whether knee-chest postural management results in no effect, a small, or small to moderate clinically significant effect.

Keywords

postural management; breech presentation; maternal knee-chest posture; evidence-based practice

INTRODUCTION

Breech presentation is associated with increased maternal-infant morbidity and mortality.¹ Routine medical management in the United States has shifted toward external cephalic version for eligible candidates and planned cesarean delivery to avoid the risks of breech presentation and birth.² However, external cephalic version poses risks, such as pain, bleeding, contractions, and fetal distress, and cesarean delivery poses risks inherent to surgery.^{3,4} Concurrently, recent practice trends away from vaginal birth after cesarean birth⁵ intensify the importance of developing lower-risk interventions for avoiding breech presentation, whenever appropriate, because women's future reproductive health is affected by primary cesarean delivery.

Postural management, advising a woman to do posture exercises to turn her infant from breech to cephalic presentation, is a common clinical practice,^{2,3,6–9} but it has not been supported by research evidence. Randomized controlled trials (RCTs) of supine hip elevation, also known as “Indian bridge,”^{10,11} and maternal knee-chest posture^{9,12} were inconclusive because of insufficient samples.^{6,13} Previous RCTs also lacked explicit theories to guide the research.¹³ A comprehensive critical review of literature further

describing conceptual and methodologic issues in previous postural management trials is presented elsewhere.¹⁴

This study, undertaken to improve on limitations found in earlier postural management studies, aimed to test an expanded theory derived from Andrews' framework for changing fetal malposition using maternal postures.¹⁵ The hypotheses were 1) maternal knee-chest posture would increase the number of cephalic versions in the intervention group compared with the number of spontaneous versions in the control group; 2) version would vary between groups by gestational age, parity, race, and amount of time in posture; and 3) posture would result in differences between groups in labor and birth outcomes, including presentation at birth, mode of delivery, birth weight, and 5-minute Apgar score.¹³ Completing the originally designed RCT was not possible because of slow accrual of research participants. The purpose of this article is to discuss the data obtained in an exploratory study of maternal knee-chest posture for cephalic version of breech presentation.

METHODS

Institutional review board approvals were obtained from three large urban hospitals in the northeastern United States. Eligible women were recruited from prenatal clinics between 1999 and 2001. Women gave written informed consent prior to participation. English- or Spanish-speaking women with singleton infants in ultra-sound-confirmed breech presentation were included. The participants were enrolled at 34 to 38 weeks' gestation. Gestational age was determined by each research site's usual protocols, all of which used last menstrual period and early dating ultrasounds. Women with complications in the current pregnancy, such as a history of heart disease, hypertension, preterm labor, third trimester bleeding, or uterine or placental abnormalities were excluded. Hjelm-Karlsson biased coin method¹⁶ was used to randomly assign women to intervention and control groups. Recruiters were three certified nurse-midwives at site 1; the researcher and three clinic nurses at site 2; and one certified nurse-midwife at site 3.

Postural Intervention

The postural intervention tested was maternal knee-chest posture as described in previous RCTs.^{9,12} The posture involved kneeling down, leaning forward using one's arms to bear upper body weight and then lowering the chest and head to rest on the floor, keeping the thighs perpendicular to the floor. Intervention group participants were taught to do maternal knee-chest posture by demonstration, return-demonstration, and written instructions with simple diagrams for how to assume the posture at home (Figure 1). They were asked to do the posture for 15 minutes 3 times per day for 7 days, and were given a log to record time spent in the posture. Control group participants were asked to conduct their usual daily activities, doing nothing to influence breech presentation. Participation in each group was verified by follow-up phone calls by the researcher or recruiters during the week of study participation.

Outcomes

All participants returned for follow-up appointments after 1 week. Presentation was assessed by Leopold's maneuvers; external cephalic version was offered if breech presentation persisted. Confirmatory ultrasound occurred within routine care for external cephalic version. Recruiters collected 11 of 14 intervention group participants' posture time logs.

The researcher collected data from hospital medical records after the 6-week postpartum visit. Data recorded included gestational age at enrollment into the study, race/ethnicity, parity, previous history of breech pregnancy, occurrence or nonoccurrence of external

cephalic version, and presentation at last prenatal visit. Categorical birth outcome variables, including presentation in labor, mode of delivery, birth weight, and normal (≥ 7) or low (< 7) 5-minute Apgar scores were recorded on the data sheet from the delivery record. There was no maternal or infant mortality. The researcher contacted three women who had not returned the posture time logs. Two women reported the amount of time spent in posture and one woman lost to follow-up was included as having done the posture in the analysis of the intervention group.

Data Analysis

Data analysis was conducted by using SPSS 11.0. Intervention, and control groups were compared for differences in prenatal covariates using two-sided Fisher exact tests with significance level set at $P < .05$. Unadjusted logistic regression to screen variables for potential inclusion in logistic regression models, using $P < .25$ as the significance level,¹⁷ examined the association of each prenatal covariate with the dependent variable cephalic version. Postural intervention was analyzed as a dichotomous (done/not done) rather than as a continuous variable (amount of time in posture). The difference in version between intervention and control groups was analyzed by using a one-sided Fisher exact test with the significance level set at $P < .05$. Two-sided Fisher exact tests were conducted to analyze the association between intervention versus control group and each birth outcome of interest with the significance level set at $P < .05$. Effect size and post hoc power analysis were calculated by using χ^2 modified for small samples and a significance level of $P < .05$ with Solo Power Analysis software (BMDP).

RESULTS

Twenty-five women completed the study. One of the 14 women randomized to the intervention group experienced cephalic version by maternal posture, and 4 of 11 women randomized to the control group experienced spontaneous cephalic version. All women in the intervention group reported doing maternal knee-chest posture at least once per day. Control group participants reported doing nothing to affect the infant's presentation. There were no differences between intervention and control groups by site, gestational age, parity, or race (Table 1).

Although the independent variable (treatment group) was sufficiently associated with the outcome variable (version) that it met the criterion for inclusion in the logistic regression model ($P < .25$), there was no statistically significant difference in version rates between intervention and control groups ($P > .05$) (Table 2). Parity and gestational age also met the screening level of significance for inclusion in a logistic regression model of maternal posture effect on cephalic version, but race was not associated with differences in version (Table 2). The small sample size was insufficient to conduct logistic regression. There were no differences between intervention and control groups in presentation in labor, mode of delivery, birth weight, or Apgar scores (Table 3). The effect size of the intervention in this sample was .36, and the power to detect this effect was low, at .44.

DISCUSSION

The results of this exploratory study call into question a clinical practice for attempting to convert breech to cephalic presentation. In this sample of 25 participants at 34 to 38 weeks' gestation, fewer women experienced cephalic version by assuming knee-chest posture for 15 minutes 3 times per day for 7 days than those randomized to control group who did not do the postural intervention. There were no statistically significant differences in spontaneous version rates between intervention and control groups. Because the sample size was small, the study had insufficient power to detect a clinically significant effect size or to draw

statistically valid conclusions. However, the trend noted in the data was in the opposite direction as that hypothesized. Did postural management prevent cephalic version of breech presentation?

The nonsignificant results can be interpreted in one of two ways. Either there was no true difference in cephalic version from maternal knee-chest posture or there was a difference that was not detected.^{18,19} This exploratory study had no power (.44) to support or refute the hypothesis that maternal posture would increase version. Power refers to how strong the chances were of finding a clinically significant difference between groups, the effect size, in the sample studied.^{18,19} Adequate sample size should provide 80% to 90% power to support statistical conclusions. For this study, a sample of 256 would be needed to provide 80% power to detect an effect size of 15% more cephalic versions from the intervention.²⁰ Smith came to a similar conclusion,⁹ estimating that 288 women would be needed to show a 13.9% reduction in breech presentation. Underpowered studies with too few participants typically lead to a type II error, the erroneous conclusion that an intervention had no effect.¹⁹

Determining a clinically significant effect size is derived from clinical experience and research literature.¹⁸ Two earlier RCTs of maternal knee-chest posture that enrolled 76 participants at 37 or more weeks¹² and 100 participants at 36 weeks⁹ found no statistically significant differences in spontaneous version between intervention and control groups. These sample sizes would have been sufficient to show moderate or large effects if maternal posture worked, but would not have shown smaller effects.^{14,18} In Chenia and Crowther's study,¹² 16 of 23 (70%) intervention participants and 12 of 25 (48%) control group participants experienced cephalic version, for an effect size of .09 and power of .12.¹³ Smith and colleagues⁹ found 4 of 51 (8%) intervention and 5 of 49 (10%) control group participants with cephalic version, resulting in .04 effect size and .07 power.¹³ These previous maternal knee-chest posture studies were also underpowered for small or small to moderate effects.¹⁴

Despite inadequate power in the current study, the unadjusted logistic screening tests suggest that it might be important to include gestational age and parity in logistic regression models in future research. All spontaneous versions in this sample occurred in multiparas before 36 weeks' gestation (Table 2). Other studies indicate that the proportion of infants in breech presentation at 32 weeks' gestation (6.7%,²¹ and 14%²²) drops to approximately 7% to 9% at 36 to 38 weeks, and then 3% to 4% at term.^{22,23} Smith controlled for gestational age by including only women in their 36th week.⁹ In addition, earlier postural management trials suggested that nonsignificant results might have been related to having more nulliparous women in their samples,^{10,12} leading other researchers^{9,11} to randomize nulliparous and multiparous women separately.²³

Implications for Practice

The data from this study and previous randomized trials of postural management may lead us to question why we recommend maternal posture for cephalic version of breech presentation because postural management is not yet an evidence-based practice. Clinicians and women with breech-presenting infants need to know that there is no research that shows a moderate or large effect of knee-chest postural management at or beyond 36 weeks, and that we do not yet know whether there is a small to moderate effect of maternal posture on cephalic version. To answer these questions, clinicians and women with breech-presenting infants are encouraged to participate in clinical research on effectiveness of postural management of breech presentation.

Future studies need to be based on sample sizes that will provide sufficient power to show a clinically meaningful difference between spontaneous version and postural version. Logistic

regression models must adjust for parity and gestational age in examining the effect of maternal posture on version.

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Figure 1.
Diagram in instruction sheet given to intervention group participants for assuming maternal knee-chest posture.

Table 1

Differences in Prenatal Covariates Between Intervention and Control Group in a Trial of Postural Management for Breech Presentation

Prenatal Covariate	Intervention (n = 14) n (%)	Control (n = 11) n (%)	<i>P</i> *
Site			.42
Site 1	5 (35.7)	7 (63.6)	
Site 2	1 (7.1)	1 (9.1)	
Site 3	8 (57.1)	3 (27.3)	
Parity			.19
0	9 (64.3)	4 (36.4)	
1–2	5 (35.7)	5 (45.5)	
3–10	0	2 (18.2)	
Gestational age, wk			.67
34	4 (28.6)	2 (18.2)	
35	5 (35.7)	5 (45.5)	
36	3 (21.4)	4 (36.4)	
37	2 (14.3)	0	
Race			.43
White	6 (42.9)	8 (57.1)	
Nonwhite	8 (72.7)	3 (27.3)	

* Two-sided Fisher exact test.

Table 2

Proportion of Successful Versions by Covariate

Prenatal Covariate	No. in Subgroup	Successful Versions n (%)	<i>P</i> [*]
Treatment group			.133
Intervention	14	1 (7)	
Control	11	4 (36)	
Parity			.002
0	13	0	
1–2	10	3 (30)	
3–10	2	2 (100)	
Gestational age, wk			.144
34	6	3 (50)	
35	10	2 (20)	
36	7	0	
37	2	0	
Race			.623
White	14	2 (14)	
Nonwhite	11	3 (27)	

* Unadjusted logistic regression.

Table 3

Differences in Birth Variables by Intervention or Control Group in a Trial of Postural Management for Breech Presentation

Birth Variable	Intervention n (%)	Control n (%)	<i>P</i> *
Presentation in labor			.24
Breech	10 (66.7)	5 (33.3)	
Nonbreech	4 (40.0)	6 (60.0)	
Mode of delivery			.24
Vaginal	4 (40.0)	6 (60.0)	
Cesarean	10 (66.7)	5 (33.3)	
5-minute Apgar			1.00
<7	1 (50.0)	1 (50.0)	
7	13 (56.5)	10 (43.5)	
Birth weight, g			1.00
2500	1 (50.0)	1 (50.0)	
2501–3999	12 (54.5)	10 (45.5)	
4000	1 (100.0)	0	

* Unadjusted logistic regression.