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Breech delivery in the all fours position: a prospective observational comparative study with classic assistance

Abstract

Objective: Vaginal delivery of fetal breech presentation is considered to be a challenge for obstetricians. The purpose of this study was to show that vaginal delivery in all fours position is feasible and safe for mother and child compared with vaginal breech and classic support.

Methods: A single-center prospective observational case series of breech delivery (n=41) in all fours position was compared to a retrospective cohort of breech deliveries in the form of a matched-pair analysis.

Results: Deliveries in the all fours position successfully took place without obstetric intervention in 70.7% of deliveries (n=29/41), and those including intervention in 90.2% (n=37/41). The rate of maternal perineal injuries was reduced (14.6% vs. 58.5%, $P < 0.001$). Newborns delivered in all fours position had increased prenatal hypoxic stress with a pH of 7.19 [95% confidence interval (CI) 7.16–7.22] vs. a pH of 7.24 (95% CI 7.21–7.27; $P = 0.016$). With n=24 vs. n=16, a higher number of newborns had a pH of < 7.20 ($P = 0.03$) and decreased base excess of -7.2 mmol/L (95% CI -8.2 – -6.2) vs. -4.8 mmol/L (95% CI -5.7 – -4.0 ; $P < 0.001$). However, this had no clinical consequences for the newborns (5 min Apgar score < 9 : n=5 vs. n=4, not significant; transfer rate to neonatal intensive care unit n=7 vs. n=6, not significant).

Conclusion: This is the first clinical evaluation of breech delivery in the all fours position. It is a feasible non-interventional obstetric delivery method. It seems to be safe for the fetus with reduced maternal morbidity. Vaginal

delivery of fetal breech presentation, even in the all fours position, creates stress for the newborn.

Keywords: All fours position; breech presentation; mode of delivery; vaginal delivery.

DOI 10.1515/jpm-2014-0048

Received February 11, 2014. Accepted August 11, 2014

Introduction

At the end of pregnancy, 4%–6% of children are in breech presentation [16]. Since publication of the Term Breech Trial [14], an increasing number of children have been delivered from breech presentation by cesarean section. Breech presentation at term is related to an increased risk of perinatal morbidity, independent of the mode of delivery [21, 22]. Compared to cesarean section, vaginal delivery is associated with an increased early fetal morbidity [26, 35] and increased perinatal mortality [23, 27]. The recent trend of delivery by cesarean section will presumably lead to a decrease in obstetric skills in performance and management of vaginal breech delivery. Although there are controversial data concerning the fetal risk of vaginal delivery [4] and criticism concerning the recommendation for a planned section [12, 18, 31], only a few obstetric centers still offer the expectant mother with the fetus in a breech position the option of vaginal delivery. The reasons are the limited selection of eligible women and the legal-guided adherence to safety conditions [1, 11, 20, 30, 32]. Experiences in the US indicates that, even after the Term Breech Trial, about 10% of pregnant women with fetal breech presentation decided to attempt vaginal delivery after selection, counseling, and under safe conditions [15]. This number varies hugely among countries, but in some obstetric departments, offering external cephalic version and vaginal delivery extensively may be higher. There are still obstetricians who are interested in maintaining the experience of conducting breech deliveries [34]. As the

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controversy about the optimal mode of delivery remains many years after publication of the Term Breech Trial, several National/College guidelines still include vaginal breech delivery as an option in selected patients [3, 10, 17] but give no recommendations regarding the optimal method/technique.

The various vaginal, partly historic, methods of delivery are described in numerous obstetrical textbooks [9]. Delivery in the all fours position is one of these methods.

Since the description of Bracht's method [6–8, 28], it has never been evaluated scientifically. Assistance in breech delivery according to Bracht is characterized as minimal mechanical intervention (the technique is similar to the Burns-Marshall procedure [9, 25] but grasping the hips of the baby) and is supported by fundal pressure after crowning as a routine. The hypothesis that vaginal delivery with or without minimal intervention by the obstetrician in the delivery process is less stressful for mother and child results from the description of the method and from personal clinical observations [33]. The propulsive forces in delivery in the all fours position are labor and gravity. No interventions or arranged maneuvers by obstetricians are planned. In deliveries in cephalic presentation, the conduct performance of delivery in knee-elbow position without epidural anesthesia – especially in the second stage of labor – show advantages over the supine position and lithotomy position [13, 29]. In this study, two different spontaneous vaginal breech delivery methods, lithotomy versus all fours position, were compared regarding the clinical postpartum newborn and maternal outcome. The aim of the study was to describe a single-center experience of a consecutive case series with both methods to compare the safety of breech delivery in all fours with vaginal deliveries of breech with classic assistance.

Material and methods

This is a prospective single-center case series of all spontaneous vaginal breech deliveries in the all fours position in an obstetric center with an integrated neonatology unit at maximum care level from October 2006 to December 2012. Women with breech presentation were informed by clinic obstetricians about the possibilities, risks and alternatives of the delivery in a non-directive informed consent. Patients were also informed about the possibility of an external cephalic version [5].

Inclusion criteria for attempting vaginal delivery were mature, healthy fetus after the completed 37th week of gestation (37+0), vaginal breech delivery requested by the mother, frank breech or complete breech presentation, and breech presentation of the second twin in twin delivery. The exclusion criteria were preterm delivery <37+0 weeks of gestation, fetus with growth delay under the 10th percentile (IUGR), estimated weight at birth <2500 g and >4000 g,

hyperextended head, footling breech position, induction of labor, and intrauterine fetal death.

If a woman gave informed consent to attempt vaginal delivery after reviewing the inclusion and exclusion criteria, she was also informed about delivery in the all fours position. Clinical pelvimetry and assessment were not systematically recorded and radiologic pelvimetry was not performed [19, 24]. Women were encouraged, but not directed, to attempt delivery from the all fours position. The final decision regarding the delivery position was always up to the expectant mother. Of the entire obstetrical team, only two obstetricians were experienced in conducting deliveries in the all fours position and motivated the expectant mother to complete delivery on all fours. The stand-by presence of a pediatrician from the neonatal department was always required as standard procedure. A delivery process was classified as delivery in the all fours position if at the end of the second stage of labor (bottom moving upwards) the knee-elbow position was maintained for delivery.

Delivery in the all fours position until the end of the second stage of labor took place according to the individual needs of the woman, supported by the midwife. At the end of the second stage of labor – at the latest after the fetal bottom had moved upwards – the midwife asked the patient to get into the all fours position. The obstetric team (midwife and physician) was just observing, present in the room and watching the delivery. In general, there were no manual maneuvers and episiotomy applied. In addition, no pharmacological support for contractions was necessary for the delivery of the head. In contrast to vaginal breech delivery in lithotomy position, the midwife did not perform perineal support or supportive measures against gravity (no fetal lifting of the bottom, just watchful waiting to prevent the newborn from dropping down after birth was completed). To facilitate the birth of the unborn fetal head only gravity is used without interference with the hanging fetal body. The weight of the unsupported fetal body creates sufficient, but gentle, traction to achieve the spontaneous birth of the head. Therefore, the infant's body was not held or supported after it was born, and was instead left to hang freely between the mother's legs until both the head and neck were delivered by gravity.

Only in case of delay during expulsion and crowning of the fetal head, obstetrical measures were given, that is, 5 IU oxytocin intravenously. Sometimes, additional thumb pressure on the fetal shoulder/clavicle was performed. If these maneuvers are ineffective to complete delivery in time, changing to supine position and classic assistance for breech delivery is required.

The comparison group included vaginal breech deliveries from the same observation period. For a matched-pair analysis, 59 patients with classical vaginally completed breech deliveries with the same parity were identified. Of these, 18 deliveries with manual maneuver were excluded during matched-pairing due to non-existing matches. Matching parameters were mature child at term, nulliparous versus multipara, and chronologically subsequent delivery. In breech deliveries of the second twin, the next twin birth was used for comparison. The second twin in malpresentation other than breech were excluded.

From the overall 46 breech deliveries in all fours performed, five were excluded during matched-pairing due to mismatch regarding the defined parameter above. The matching pair process is graphically displayed (Figure 1). Apgar, pH at birth and base excess from the umbilical artery and vein, as well as neonatal transfer rate, were compared. The prospectively acquired data were transferred from the clinic's obstetric database. All data were complete for evaluation.

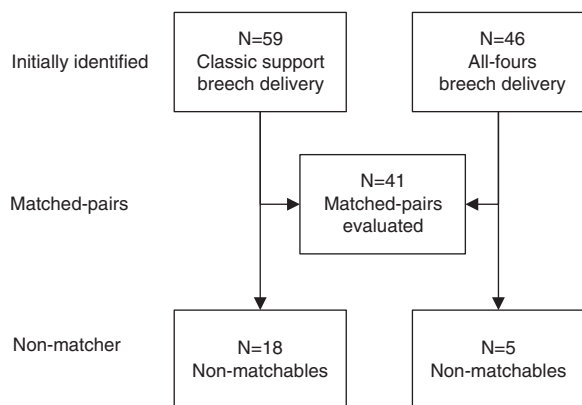


Figure 1 Design of the study.

Statistical analysis of perinatal outcome data was performed by univariate analysis with *t*-test and Mann-Whitney test using a logistic regression model and by multivariate logistic regression analysis with SPSS software (version 16; SPSS Inc. Chicago, IL, USA). The significance level was set to 5% ($\alpha=0.05$).

Results

Altogether, 46 vaginal breech deliveries in all fours were performed, of which five were excluded during matched-pairing due to mismatch. The resulting 41 delivery pairs included 36 single and five twin births, of which were 16 nulliparous and 25 multiparas. The allocation of frank breech position ($n=29$) and other breech positions ($n=12$) was equal. The age of the mothers and the week of gestation did not show any significant differences [30.8 years [95% confidence interval (CI) 29.5–32.4] vs. 32.6 years [95% CI 30.9–34.3], $P=0.09$; age at gestation 39.9 weeks [95% CI 39.4–40.4] vs. 39.5 weeks [95% CI 38.9–40.0], $P=0.25$].

The children in the group of all fours position were significantly heavier than the children in the control group with 3231 g (95% CI 3089–3373) vs. 3015 g (95% CI 2882–3148) ($P=0.028$). The head circumference of the children was comparable with 34.9 cm (95% CI 34.4–35.4) vs. 34.3 cm (95% CI 33.8–34.7) ($P=0.06$) (Table 1).

Umbilical pH in newborns from the all fours position group was 7.19 (95% CI 7.16–7.22) vs. 7.24 (95% CI 7.21–7.27) ($P=0.016$) and base excess in the postpartum analysis from the umbilical artery was significantly lower with -7.2 mmol/L (95% CI -8.2 – -6.2) vs. -4.8 mmol/L (95% CI -5.7 – -4.0) ($P<0.001$). The number of children with a postpartum pH <7.20 [$n=24$ (57.5%) vs. $n=16$ (37.5%), $P=0.03$] was higher. Two infants in each group postpartum pH of ≤ 7.10 but no pH below 7.0. Seven neonates in the all fours group had base deficits <-10 vs. 1 in the lithotomy group. The clinical state of the children evaluated with the 5 min Apgar score and the postpartal transfer rate to the intermediate care unit did not differ ($n=16$ vs. $n=15$; and $n=7$ vs. $n=6$ respectively; not significant; Tables 2 and 3).

The duration of delivery did not differ in both groups (all fours vs. classical assistance) with a total duration of delivery of 5.6 h (95% CI 4.4–6.7) vs. 5.6 h (95% CI 4.3–7.0) ($P=0.94$), as well as length of second stage of labor with 50.8 min [95% CI 38.4–63.1] vs. 44.8 min (95% CI 29.7–60) ($P=0.53$). The proportion of women with epidural anesthesia was comparable with $n=2$ (4.9%) vs. $n=7$ (17.1%; $P=0.25$). Injuries to the birth canal including episiotomies occurred significantly more often in the group classic assistance for the breech delivery with 25 (61%) vs. six (14.6%) in all fours ($P<0.001$), (Table 3). Moreover, and this makes the difference between the two groups, episiotomies were indicated as the standard practice in deliveries where there was classic assistance with 25 (61%) vs. three (7.3%) in the all fours position ($P<0.001$). After the classic

Table 1 Comparison of the groups regarding parameters of pregnancy.

	Normal breech delivery				All fours position				t-test P-value
	n	Mean (\pm SD)	95% CI	Median	n	Mean (\pm SD)	95% CI	Median	
Age of the mother	41	32.6 (± 5.4)	30.9–34.3	32.6	41	30.8 (± 4.1)	29.5–32.1	31.4	0.087
Week of gestation	41	39.5 (± 1.6)	38.9–40.0	40	41	39.9 (± 1.6)	39.4–40.4	40	0.248
Weight (g)	41	3015 (± 423)	2882–3148	2980	41	3231 (± 451)	3089–3373	3290	0.028
Head circumference (cm)	41	34.3 (± 1.4)	33.8–34.7	34.0	41	34.9 (± 1.7)	34.4–35.4	35.0	0.056
Sex		M=15 F=26	36.6% 63.4%			M=22 F=19	53.7% 46.3%		0.120
Position									
Frank breech position		29	70.7%			30	72.5%		0.860
Other		12	29.3%			11	27.5%		

SD=standard deviation, CI=confidence interval.

of episiotomy and a high vaginal laceration and a perineal tear grade III). Two newborns were postpartally transferred to the intermediate care unit due to neonatal adaptation disorders in this “converted” (lithotomy) group.

Discussion

This is the first study that prospectively describes and compares vaginal breech delivery in the all fours position with other vaginal delivery methods. Only the results of an investigation of spontaneous vaginal obstetric management of breech deliveries are available [6, 7]. For vaginal breech deliveries, a safe and easy method is recommended that involves no additional stress for the child and promises relief for the mother. The all fours position itself has many advantages for the delivery and the peripartal management [33]. In most cases (70%), it facilitates spontaneous delivery that uses gravity to aid the birthing process. This study showed that in 30% of deliveries, physicians were needed to provide expertise and skills to achieve a vaginal breech delivery. Despite the easy technique of the delivery process, experience and training on simulation of breech delivery are still demanded for obstetricians [17]. This is confirmed by the fact that in a third of deliveries with need of intervention, a conversion and completion using classic assistance in breech delivery was necessary. Complications, such as nuchal arms, still require traditional obstetrical maneuvers [9]. In case of unplanned breech deliveries in the absence of an obstetrician, this method might be a good option. The conditions for breech delivery on all fours depends on patient obstetricians, “watchful waiting” and avoiding interventions. The only force for progress of delivery should be gravity. In our institution all fours is a well-accepted procedure. All fours potentially avoids disadvantages of classic interventions at the costs of delayed late phase of second stage of labor and the slightly increase of fetal acidosis.

This study is focused on prospective observation and examination of the second stage of labor in breech deliveries. The acquisition of data on the number of aborted vaginal deliveries and the number of secondary sections after trial of labor was not part of this study. During the investigation period, a total of $n=11/57$ (19.3%) of all intended breech deliveries were converted to cesarean section during the first stage of labor. This corresponds to the experience of others [20, 30]. For the creation of matched pairs, we had to exclude 18 deliveries with classical support in lithotomy position in the period of this study due to missing partners for matching. Evaluation of these deliveries showed no difference to the compared

collective [$n=18$, predominantly nulliparous women with gestational age of 39 ± 1.5 weeks, birth weight of 2883 ± 300 g, circumference of the head with 34 ± 1 cm, duration of the delivery of 8.6 ± 2.7 h, duration of the second stage of labor of 83.7 ± 46.4 min, pH of 7.20 ± 0.06 , base excess of -5.3 ± 1.9 mmol/L, $n=3/18$ newborns (16.7%)] and were transferred to the neonatal unit. The reason for the delay of labor and delivery in this subgroup were that the majority were primipara $n=16/18$ (88.9%).

Maternal injuries to the birth canal in the classic group appear to be related to episiotomies in most cases. As episiotomy is encouraged for the “classic delivery”, this difference is probably explained by predetermined interventions rather than actual maternal injuries as a result of the birth process. However, omitting episiotomies in all fours was shown to be not associated with relevant worsening of neonatal outcome for this case series. Severe perineal injuries (3rd degree laceration, $n=2$) after delivery in the all fours position occurred especially after the change to classic assistance in breech delivery. A measurable advantage for the child could not be found. The consequences of increased prepartal fetal stress due to breech delivery are an increase of acidosis and lower Apgar scores in newborns [30]. Our results confirm that this is slightly increased for delivery in the all fours position. However, the immediate postpartal clinical outcome of the newborns showed no obvious negative impact and did not result in a higher rate in postpartal transfer to the neonatal intensive care unit. A reason for the relatively increased fetal stress due to delivery in the all fours position might also have been higher birth weight ($P=0.028$) and the trend to larger head circumference ($P=0.06$) compared to breech delivery with classical assistance.

The patient population of this study consisted of a mixed cohort of primiparous and multipara women. The matching criteria (parity and single child/twin) resulted from the different delivery progresses under these influencing factors [2]. One part ($n=5$) were the deliveries of the second twin in multiple births. Twin births are, according to our experience, easily achievable in this delivery position. A sub-analysis of this subgroup was not performed due to small numbers of twin deliveries.

All fours deliveries come about with a high level of obstetric care. The requirements for delivery are a good prepartal selection, consultation and observation of the delivery by an experienced obstetrical team [18, 30], as well as the primary care of the child by a pediatrician.

The strength of this study is that for the first time, two different methods of vaginal delivery of breech presentation are compared regarding postpartal outcome of mother and newborns. The study shows, as a prospective

observation, the feasibility of one option for vaginal breech delivery. The limitations of this study are the low number of participants and that the differences measured between both groups are rather small. Another limitation is the different approach to delivery, *a priori*, which likely explains differences in perineal traumas and cord gases. To identify additional differences, a larger number of study participants would have to be included, preferably in a prospective and randomized multicenter trial.

Despite our experience with vaginal breech deliveries, the controversies of mode of delivery in breech presentation persist. An optimal mode of delivery has yet to be determined. However, breech deliveries on all fours seems to offer a reasonable and safe alternative to classic delivery in lithotomy position, for example, with the Bracht maneuver.

In conclusion, vaginal breech delivery is stressful for the fetus with high early morbidity and a high neonatal transfer rate of children. The delivery in the all fours position is an alternative method and option to the classic obstetric support and broadens the techniques in vaginal delivery. This study demonstrates that vaginal breech delivery is often possible and safe with a spontaneous delivery process and without mechanical intervention. Omitting episiotomy is possible without worsening the neonatal outcome and without increasing the rate of perineal trauma.

Acknowledgments: Dr. Mynda Schreuer for her counseling and statistical analysis.

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The authors stated that there are no conflicts of interest regarding the publication of this article.