

Perinatal Outcome of Vaginal Breech Delivery in Nulliparous Mothers in a Tertiary Hospital of a Low-Resource Setting: A Case-Control Study

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Abstract

Introduction:

Nulliparity is a crucial issue to consider in vaginal breech delivery, and this study aims to identify the perinatal outcome in vaginal breech deliveries in nulliparous women.

Methodology:

A retrospective case-control study conducted at Orotta National Referral Teaching Hospital from 2019 to 2023. Vaginal breech deliveries were enrolled as cases, and four cephalic deliveries as controls.

Results

A total of 365 medical records of nulliparous mothers were analyzed, and the prevalence of stillbirth was 7.7%. Vaginal breech deliveries were significantly associated with low birth weight of < 2.5 kilogram (aOR: 4.14, 95% CI: 1.74–9.82), first minute Apgar score of < 7 (aOR: 9.21, 95% CI: 3.37–24.65), fifth minute Apgar score of < 7 (aOR: 6.36, 95% CI: 1.36–29.73), and referral to neonatal intensive care unit (aOR: 0.16, 95% CI: 0.035–0.74).

Conclusion

Vaginal breech deliveries in nulliparous women were associated with low first and fifth minute Apgar scores in a low-resource setting.

Introduction

Breech is the commonest malpresentation, and nulliparous mothers with breech presentation in labor are prone to deliver by cesarean section [1–3]. Since up to 4% of fetuses are in breech presentation at term, a substantial number of mothers seek counseling regarding the most successful and safest mode of delivery [2, 4]. Studies in the United States have shown high rates of caesarean section among primigravidas with breech presentation at term (89.6–95.7%, Robson Criteria 6) [5]. Nulliparity seems not to be an exclusion criterion for intended vaginal breech birth at term. However, it is still important to inform the women of an increased risk of going to a cesarean section during labor [4, 6]. An attempt for a vaginal delivery would only be reasonable in a specialized center if the fetal weight is estimated in the normal range and if the woman has experienced a vaginal delivery before [4, 7].

Proper planning of delivery methods is important to avoid adverse pregnancy outcomes, in which birth weight and pelvic measurements should be topics of great importance in patient counselling [7]. Opposite to vertex delivery, in vaginal breech delivery, different parts are delivered in the reverse direction

of size, and the last, suddenly increased head size predisposes to dystocia or neck entrapment [8]. Pelvimetry is often recommended in nulliparous mothers before offering vaginal breech delivery; however, it has not been shown to predict neonatal outcome, and there is still no consensus on the interpretation of magnetic resonance imaging (MRI) measurements [9].

Neonatal complications, especially birth traumas, are more common among the babies of primiparous mothers, and overall vaginal breech delivery was less safe than cephalic presentation fetuses [1, 2, 10, 11]. Vaginal breech deliveries (VBDs) are associated with a 10-fold increase in perinatal mortality when compared with vaginal cephalic deliveries (VCDs) [12]. In low-resource settings like Eritrea, where proper selection of planned vaginal breech delivery was not performed, should a direct caesarean section be preferred for breech presentation at term in nulliparous mothers, as it is being practiced? This study aims to determine the perinatal outcome of vaginal breech delivery in nulliparous mothers.

Methodology

Study Design and Period

This was a unicentre, retrospective case-control study with medical records review of nulliparous mothers delivered vaginally at Orotta National Referral and Teaching Hospital from 2019 to 2023.

Study Population

The study population was all nulliparous mothers delivered vaginally at Orotta National Referral and Teaching Hospital, with vaginal breech deliveries considered as cases and vaginal cephalic deliveries considered as controls.

Eligibility Criteria

Delivery registers with complete information of all nulliparous vaginal deliveries were eligible in the study. Twin pregnancy, gross congenital anomalies (anencephaly and hydrocephalus), and instrumental vaginal deliveries were excluded from the study.

Sample Size and Sampling Method

Since this study utilized secondary data, the sample size was predetermined. The study included all nulliparous mothers who experienced vaginal breech delivery, with four cephalic vaginal deliveries recruited for each case. Controls were randomly selected from a list of nulliparous mothers who had cephalic vaginal deliveries. Although the sample size was fixed, the statistical power of the study was assessed to determine whether it was adequate. To evaluate the study's power, the first-minute Apgar score was used as a key parameter. The proportion of controls with a low Apgar score (< 7) was

estimated at 4%, while among cases, it was 18% [13]. Based on these estimates, with 73 cases and 292 controls (four controls per case) and a confidence level of 95%, the calculated power of the study exceeded 90%. Therefore, the study had sufficient power to detect a meaningful difference if one truly existed.

Data Collection and Analysis

A specific data extraction tool was designed to retrieve data from the delivery register based on the available information in the register. The data were entered into MS Excel, cleaned, and missing data were refilled by double-checking the register. Finally, the dataset was exported to SPSS version 26 for analysis. The frequency and percent were determined, and the mean was calculated for continuous variables. Univariate and multivariate analysis was done using logistic regression to determine the association, and a p-value < 0.05 was considered significant.

Ethical Considerations

Ethical approval

was obtained from the Ministry of Health Research Approval and Ethical Committee (reference number 30/03/2023), and respected authorities were informed. Informed consent was not sought as this was secondary data. The personal identifiers of patients were coded and analyzed as aggregates. This study conforms to the principles outlined in the Declaration of Helsinki.

Results

A total of 365 medical records of nulliparous mothers were analyzed with a case-to-control ratio of 1:4. Most of the mothers were from Zoba Maekel (91.5%), and the mean age was 24.22 ± 4.08 . Teenage pregnancy was documented in 11.8% and it was slightly higher in VBDs (Case: 16.4% VS Controls: 10.6%). Only 1.1% had their first baby at an advanced age (> 35 years). The history of abortion was documented in 2.2% of the study participants, and all the abortions had occurred in mothers who gave vaginal breech deliveries. (Table 1)

Gender of the newborn was almost similar, with equal distribution among vaginal breech deliveries and vaginal cephalic deliveries. Low birth weight was documented in 13.2% of the newborns, with a high proportion among VBDs (Cases: 38.4% VS Controls: 6.8%). The overall < 7 first-minute Apgar score was 23.8% and a markedly higher proportion was found in VBDs (Cases: 67.1% VS Controls: 13%). Fifth-minute Apgar score of < 7 also showed a big difference among the study groups (Cases: 49.3% VS Controls: 5.5%). Total NICU admission was documented in 9% with 16.4% in VBDs and 7.2% in vaginal cephalic deliveries. The prevalence of stillbirth was 7.7% with a significant proportion seen in VBDs (Cases: 28.8% VS Controls: 2.4%). (Table 1)

Table 1
Sociodemographic characteristics of primiparous vaginal deliveries at Orotta
National Referral and Teaching Hospital, 2019–2023.

Variables	Total N (%)	Mode of delivery		P-Value
		VCD N (%)	VBD N (%)	
Maternal age (years)				
16–19	43 (11.8)	31 (10.6)	12(16.4)	0.114
20–34	318 (87.1)	259 (88.7)	59 (80.8)	
>34	4 (1.1)	2 (0.7)	2 (2.7)	
Address (Zoba)				
Maekel	334 (91.5)	281 (96.2)	53 (72.6)	0.001
Other zoba	31 (8.5)	11 (3.8)	20 (27.4)	
Gravida				
1	357 (97.8)	292 (100.0)	65 (89.0)	0.001
>1	8 (2.2)	0 (0)	8 (11)	
History of abortion				
0	357 (97.8)	292 (100.0)	65 (89.0)	0.001
>=1	8 (2.2)	0 (0)	8 (11)	
Birth weight, in KG				
<2.5	48 (13.2)	20 (6.8)	28 (38.4)	0.001
2.5–3.5	284 (77.8)	224 (83.6)	40 (54.8)	
> 3.5	33 (9)	28 (9.6)	5 (6.8)	
Apgar 1st minute				
<7	87 (23.8)	38 (13.0)	49 (67.1)	0.001
>=7	278 (76.2)	254 (87.0)	24 (32.2)	
Apgar 5th minute				
<7	52 (14.2)	16 (5.5)	36 (49.3)	0.001
>=7	313 (85.8)	276 (94.5)	37 (50.7)	
Sex				
VBD: Vaginal breech delivery, VCD: Vaginal cephalic delivery				

Variables	Total N (%)	Mode of delivery		P-Value
		VCD N (%)	VBD N (%)	
Female	179 (49)	145 (49.7)	34 (46.6)	0.638
Male	186 (51)	147 (50.3)	39 (53.4)	
Alive or stillbirth				
Alive	337 (91.5)	285 (97.6)	52(71.2)	0.001
Stillbirth	28 (7.7)	7 (2.4)	21 (28.8)	
Referred to the NICU				
No	332 (91)	271 (92.8)	61 (83.6)	0.014
Yes	33 (9)	21 (7.2)	12 (16.4)	
VBD: Vaginal breech delivery, VCD: Vaginal cephalic delivery				

In univariable analysis, vaginal breech deliveries were found to be significantly associated with patients referred from other Zobas (OR: 2.08, 95% CI: 1.64–2.63, $P < 0.001$), birth weight of < 2.5 kilogram (OR: 8.54, 95% CI: 4.39–16.69, $P < 0.001$), first minute Apgar score of < 7 (OR: 13.6, 95% CI: 7.52–24.75, $P < 0.001$), fifth minute Apgar score of < 7 (OR: 16.78, 95% CI: 18.49–33.18, $P < 0.001$), referral to NICU (OR: 2.54, 95% CI: 1.19–5.44, $P < 0.017$), and stillbirth (OR: 16.44, 95% CI: 6.65–40.64, $P < 0.001$). In multivariable analysis, vaginal breech deliveries were significantly associated with patients referred from other Zoba's (aOR: 10.41, 95% CI: 3.97–27.24, $P < 0.001$), birth weight of < 2.5 kilogram (aOR: 4.14, 95% CI: 1.74–9.82, $P < 0.001$), first minute Apgar score of < 7 (aOR: 9.21, 95% CI: 3.37–24.65, $P < 0.001$), fifth minute Apgar score of < 7 (aOR: 6.36, 95% CI: 1.36–29.73, $P < 0.019$) and referral to NICU (aOR: 0.16, 95% CI: 0.035–0.74, $p < 0.019$). (Table 2)

Table 2
Univariable and multivariable analysis of vaginal breech deliveries in nulliparous mothers delivered in Orotta National Referral and Teaching 2019–2023.

Variables	OR	95% CI	P-Value	aOR	95% CI	P-Value
Address (Zoba)						
Maekel (Ref)	1	-		-	-	
Other zoba	2.08	1.64–2.63	0.001	10.41	3.97–27.24	0.001
Birth weight, in KG						
<2.5	8.54	4.39–16.59	0.001	4.14	1.74–9.82	0.001
2.5–3.5 (Ref)	1	-		-	-	
> 3.5	1.09	0.39–2.98	0.86	0.99	0.39–3.52	0.998
Apgar 1st minute						
<7	13.6	7.52–24.75	0.001	9.21	3.37–24.65	0.001
>=7 (Ref)	1	-		-	-	
Apgar 5th minute						
<7	16.78	18.49–33.18	0.001	6.36	1.36–29.73	0.019
>=7 (Ref)	1	-		-	-	
Birth Outcome						
Alive (Ref)	1	-		-	-	
Stillbirth	16.44	6.65–40.64	0.001	0.245	0.03–1.62	0.144
Referred to the NICU						
No (Ref)	1	-		-	-	
Yes	2.54	1.19–5.44	0.017	0.16	0.035–0.74	0.019
OR: Odds Ratio, aOR: Adjusted Odds Ratio						

Discussion

The mode of delivery in breech presentations at term is a controversially discussed topic in obstetrics, and nulliparity is a crucial issue to consider. Pelvimetry is often recommended before offering vaginal breech delivery, and previous successful vaginal delivery is the best pelvimetry method [1, 9, 14]. Several imaging studies, including MRI, are used for pelvimetry mainly due to nulliparity, where their availability in low settings was limited [9, 14, 15]. In our setting, breech presentation at term in nulliparous women was a direct indication for caesarean section, and those included in this study were women who came in later

stages of labor and delivered vaginally. We tried to assess their perinatal outcome in comparison with cephalic vaginal deliveries in nulliparous mothers.

In this study, the rate of teenage pregnancy was 11.8%, which was similar to a study conducted in a similar low-setting (10.7%) [16]. This finding identified that teenage pregnancy had no association with mode of delivery but might predispose to adverse perinatal outcomes because teenagers have less developed pelvis and lower antenatal care utilization. In this study, the prevalence of stillbirth was 7.7% with great variation among the cases, which was almost similar to a study conducted in a similar setting in Zimbabwe (5.8%) [17]. In resource-limited areas where breech presentations are identified during labor, adverse perinatal outcomes could be amplified more in nulliparous mothers due to the passage of the fetus through an untested pelvis. In this study, stillbirths were not significantly associated with the mode of delivery in nulliparous mothers, which aligns with other studies [4, 8, 18].

Our study identified a significant association of adverse perinatal outcomes in nulliparous women (low first and fifth minute Apgar score with vaginal breech delivery compared with vaginal cephalic deliveries. A study conducted in India stated that breech presentation in primigravida results in worse perinatal outcomes compared to multipara [19]. Furthermore, a study in Finland also reported that nulliparity was associated with adverse perinatal outcomes [20]. Contrarily, a study conducted on late preterm deliveries stated that primiparity in breech deliveries was not found to be a risk for perinatal morbidity [21]. The higher adverse perinatal outcome of VBDs in nulliparous women in our study could be due to going into labor without pelvimetry and the shortage of manpower know-how to perform vaginal breech delivery. Referral to NICU was found to be a protective association with vaginal breech delivery in nulliparous mothers, possibly due to its correlation with stillbirth and Apgar score.

A study in a Portuguese hospital suggests that breech vaginal delivery remains a safe option under strict selection criteria and in the presence of an experienced obstetrician [22]. Since some international guidelines still recommend "nulliparity" as an exclusion criterion for a vaginal breech birth [4] in resource-limited areas like Eritrea, where both pelvimetry and manpower experienced in VBDs were not easily available, direct caesarean section could favor better perinatal outcomes. But, future potential pregnancy consequences after cesarean section, especially trial of labor at home, could lead to fetal loss due to uterine rupture and maternal death [9]. So, a thorough explanation of the possible future pregnancy complication and the necessity of regular antenatal care at a high-risk clinic and hospital delivery to the mother is necessary, not to jeopardize maternal life, to improve perinatal outcome.

This study wasn't without limitations. Being retrospective in nature, and difficulty in determining fetal status during admission to the labor ward were the main drawbacks. Furthermore, the small sample size of the study also leads to low precision of results. A prospective case-control study of vaginal breech delivery in nulliparous mothers in multiple centers can give a broader and clearer view of perinatal outcome. Perinatal outcomes could be improved by upgrading the quality of antenatal care, including identifying breech presentations before the onset of labor. Furthermore, giving training courses on how

to make vaginal breech delivery to health workers and making a prompt joint decision on the mode of delivery might improve birth outcomes.

Conclusion

Our study identified a low first and fifth minute Apgar score in vaginal breech deliveries compared to cephalic deliveries in nulliparous mothers. In resource-limited settings where proper planning methods of delivery using pelvimetry in breech presentation were not carried out, adverse neonatal outcomes should be explained to mothers to assist in a prompt joint decision on mode of delivery.

Abbreviations

aOR: Adjusted Odds Ratio

ANC: Antenatal Care

CI: confidence interval

OR: Odds Ratio

VCD: Vaginal cephalic delivery

NICU: Neonatal intensive care unit

ONRTH: Orotta National Referral Teaching Hospital

SD: Standard deviations

SPSS: Statistical Package for Social Sciences

VBD: Vaginal breech delivery

Declarations

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Authors Contribution

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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