

Factors associated with poor delivery outcomes among women delivering by breech in South Western Uganda: Unmatched case control study

Mayanja Ronald MD¹, Masembe Sezalio MD¹, Nanzira Rachael MD¹, Njagi Joseph MD¹, Chakura Andrew MD¹, Ngonzi Joseph MD¹

¹Department of obstetrics and Gynecology, Mbarara University of Science and Technology, Uganda

Abstract

Background: It is globally observed that breech delivery through vaginal route is associated with more adverse neonatal outcomes compared to caesarian section including low 5 minute Apgar score and perinatal mortality increased. The ideal mode of delivery in breech presentation remains an area of intense controversy worldwide coupled with paucity of studies to high light factors associated with poor outcomes among breech deliveries.

Objective: This study set out to determine the neonatal delivery outcomes in women delivering by breech at Mbarara University teaching hospital, South Western Uganda and factors associated with poor neonatal outcomes among breech deliveries.

Methods: This was an unmatched case control study of 208 breech births between January to December 2014. Relevant socio-demographic and obstetrical variables were abstracted from patients' records. The data was analyzed using SPSS and cross tabulations were done and frequencies, percentages and Pearson Chi-square statistics obtained. Bivariate and multivariate logistic regression models were used to test association. Significance level was set at p value < or = 0.05

Results: Among the 206 deliveries that were analyzed, 120 babies delivered by caesarean section (C/S) and 86 by assisted vaginal breech delivery. In the C/S group, 4 (3.3%) were fresh still births (FSB) and 116 (96.7%) were live births while in the assisted vaginal breech group, 25 (29.1%) were FSB and 61 (70.1%) were live births. Babies born by C/S had better Apgar scores at 5 minutes with 5 (4.1%) of babies born through C/S scored 0-6 while 115 (95.8%) scored between 7-10 whereas 31 (36%) of babies born by assisted vaginal breech delivery scored between 0-6 while 55 (64%) scored between 7-10. The factors associated with low Apgar scores at five minutes and fresh still births were vaginal mode of delivery, birth weight of less than 3 kilograms and multiparity.

Conclusion: Safe caesarian section and birth weight >2.5kg is associated with better perinatal outcome among breech deliveries

Keywords: Breech delivery, mode of delivery, birth weight, Apgar score, perinatal outcome.

BACKGROUND

Breech presentation is where the fetal buttocks or feet present at the pelvic inlet. These can be delivered either vaginally or by caesarian section. It has been universally observed that breech delivery via vaginal route is associated with more adverse neonatal outcomes than by caesarian section. There are three types of breech presentation-frank breech (most common, 50- 70%), complete breech (5-10%) and footling or incomplete breech (10-30%). Breech presentation occurs in 3-4% of all deliveries. The predisposing factors for breech presentation include prematurity, uterine abnormalities (e.g. malformations, fibroids), fetal abnormalities (e.g. CNS malformations, neck masses, aneuploidy, and hydrocephalus) and multiple gestations (Vistad et al., 2013).

The risk of perinatal mortality associated with vaginal breech delivery may be 2-5 times higher than planned caesarean section. It is estimated that perinatal mortality for breech presentation at term is about 4-5% for vaginal delivery and 2-4% for caesarean section. The higher perinatal mortality and morbidity associated with breech presentation is due principally to prematurity, congenital malformation, birth asphyxia and trauma asphyxia, bone fractures, intraventricular hemorrhage, convulsions, respiratory distress syndrome, necrotizing enterocolitis, congenital hip dislocation (Min Su et al., 2004)

The mode of delivery in breech presentation remains an area of intense controversy. Various options are External Cephalic Version (ECV), planned caesarean section and vaginal delivery. There has been an increasing reluctance for vaginal delivery in many centres (RCOG 2006: ECV and Reducing the Incidence of Breech Presentation guidelines). Eligibility criteria for vaginal trial of labor includes frank or complete breech at term or near term, fetal weight of 2500-3800 grams, no history of uterine scar, gestation age greater than 34 weeks, proper intrapartum fetal monitoring, adequate maternal pelvis, fetal head flexion and adequate amniotic fluid volume (Alarab et al., 2004).

In a study by Samia in 2008, 10% of all the breech deliveries had an Apgar score of less than eight at 5 minutes while there were 3% still births. Perinatal mortality was 4% (stillborn 3%, neonatal death 1%). The cause of death was prolonged labour (Samina et al., 2008). In a study by Ismail in 1999, the rate of fetal depression among women delivering by breech at five minutes was higher in the vaginal group compared to the C/S group. Among very low birth weight (VLBW) infants (< 1500 grams) the mortality rate was also higher in the vaginal group at 57.4% and 18.0% in C/S deliveries (Ismail et al., 1999). In a study by Sivakova in 2014, the neonatal outcomes were found to be comparable in the group of preterm deliveries (n = 67) terminated by vaginal delivery or by C/S. All neonatal deaths in the same study were associated with extreme prematurity and not with type of termination of gravidity (Sivakova et al., 2014).

Furthermore, studies consistently show adverse outcomes with preterm and low birth weight babies especially delivered vaginally by breech and also in mothers with inadequate antenatal care. The rate of serious perinatal morbidity in the trial-of-labor and cesarean delivery groups was 2.3% and 0.5%, respectively. The rate of developmental delay was 1.9% and 0.5% (Giulian et al., 2003). Vaginal delivery of 1000-1500 gram babies presenting as breech is associated with the increased neonatal mortality compared with cesarean delivery. Neonatal complications did not differ between the group of women with term babies, <1000 gram babies, >1500 gram babies in breech presentation for women that had vaginal delivery and those that had cesarean delivery. On the other hand, breech presentation in preterm delivery between 1000 and 1500 grams birth weight appears an independent risk factor for the neonatal mortality (Demirci et al., 2012).

Vaginal breech delivery of a preterm and low birth weight newborn is associated with significantly increased neonatal mortality as compared to cesarean section at similar birth weights. Birth trauma and asphyxia is greater with vaginal breech delivery as compared to cephalic vaginal delivery, suggesting that cesarean delivery may be a safer route of delivery for preterm breech fetuses (Robilio et al., 2007).

This study was aimed at determining the perinatal outcomes and associated factors among women delivering by breech at Mbarara Regional Referral Hospital in south western Uganda.

METHODS AND MATERIALS

Study design: This was an unmatched case control study.

Study site: The study was done in the labor wards of Itojo district hospital and Mbarara Regional Referral Hospital (MRRH) in south western Uganda. MRRH is a teaching hospital for Mbarara University of science and technology and a regional referral hospital for south western Uganda while Itojo hospital is one of the district hospitals in south western Uganda. MRRH is located in Mbarara municipality, Mbarara district, South Western Uganda, located 280 kilometers from the capital, Kampala. The hospital is owned and financed by the Government of Uganda through Ministry Of Health and serves 5 million people and 10 districts including the neighboring countries of Tanzania, Rwanda and Democratic Republic of Congo. The hospital delivers about 10,000 mothers annually.

Sampling method: It was by consecutive case sampling.

Study population: Charts of women who delivered by breech during the study period at these study sites.

The independent variables included the following: Hospital of delivery (MRRH and Itojo), maternal Age, Parity, Birth weight (kgs), Mode of delivery.

The Outcome study variables included the Apgar score at 5 minutes and status of baby at birth (alive or dead).

Sample size calculation: Kelsey formula for unmatched case control studies with continuity correction was used. Sample size of 206 was obtained. (Kelsey et al., Methods in Observational Epidemiology 2nd Edition)

Statistical analysis: The data was entered in an EXCEL spreadsheet and analyzed using SPSS statistical software, version 20 (SPSS, Chicago, IL, USA). Cross tabulations was conducted to obtain descriptive statistics which were presented as frequencies, percentages and Pearson Chi-square statistics. Bivariable and multivariable logistic regression models were used to test the association of the independent variables with the dependent (outcome) variable. Variables with p-value <0.05 at bivariable analysis were included in multivariable logistic regression analysis. Results were presented with odds ratios and the corresponding 95% Confidence Intervals and significance was accepted at $p < 0.05$.

Ethical approval: Ethical approval to carry out the study was obtained from Mbarara University of Science and Technology Institutional Review Board (MUST IRB) and the Uganda National Council for Science and Technology (UNCST). The ethical clearance number is 06/06-15.

RESULTS:

Table 1. Participant characteristics

Characteristics		N=206	Percent
Hospital name,	Mbarara	154	75.0
	Itojo	52	25.0
Age(years) ,	<20	24	12.3
	20+	171	87.7
	Missing	13	6.7
Parity ,	Multi-parous	126	60.6
	Prime para	76	36.5
	Missing	6	2.9
Mode of delivery,	Vaginal	87	41.8
	Caeserean	121	58.2
Birth weight(Kg),	<3.0	77	37.0
	3.0+	114	54.8
	Missing	17	8.2

Records of 206 women who had breech delivery at Mbarara and Itojo Hospitals was reviewed for a period of one year (from January to December 2014). Of these, 154 (75%) participants delivered from Mbarara Hospital while 52 (25%) delivered from Itojo district Hospital. Most women were in the age category of 20 and more years, 60.6% were multiparous while 58.2 % (121) of the deliveries were by caesarean section. Most of the prime gravidas delivered by caesarean section while multigravidas had vaginal delivery. Majority of the babies born had birth weight of less than 3 kilograms. Among all the deliveries, 120 babies were delivered by caesarean section (C/S) and 86 by assisted vaginal breech delivery. In the C/S group, 4 (3.3%) were fresh still births (FSB) and 116 (96.7%) were live births while in the assisted vaginal breech group, 25 (29.1%) were FSB and 61 (70.1%) were live births. Babies born by C/S had better Apgar scores at 5 minutes with 5 (4.1%) of babies born through C/S scoring 0-6 while 115 (95.8%) scored between 7-10 whereas 31 (36%) of babies born by assisted vaginal breech delivery scored between 0-6 while 55 (64%) scored between 7-10.

Table 2: Factors associated with low Apgar score at five minutes

Variables		Grouped A/S at five minutes		Odds ratio(95% CI)	p-value
		0-6	7-10		
Hospital name,	Mbarara	31(20.1)	123(79.9)	2.369(0.869-4.6457)	0.084
	Itojo	5(9.6)	47(90.4)		
Age group	<20	6 (25)	18(75)	1.632(0.597-4.466)	0.336
	20+	29 (17)	142 (83)		
Parity,	Parous	29(23.0)	97(77.0)	2.904(1.203-7.014)	0.014
	Prime gravida	7(9.3)	68(90.7)		
Mode of delivery,	Vaginal	31(36.0)	55(64.0)	12.964(4.780-35.159)	0.000
	Caeserean	5(4.2)	115(95.8)		
Birth weight(Kg),	<3.0	24(31.2)	53(68.8)	3.849(1.785-8.299)	0.000
	3.0+	12(10.5)	102(89.5)		

The factors associated with low Apgar scores at five minutes were vaginal mode of delivery with a p-value of < 0.001, OR (95% CI) 12.964(4.780-35.159); birth weight of 3 or more kgs with a p-value of <0.001, 3.849(1.785-8.299) and multiparity with a p-value of 0.014, OR (95% CI) 2.9 (1.203-7.014).

Table 3: Factors associated with fresh still birth

Variables	Status of baby at birth		Odd's ratio(95% CI)	p-value
	FSB	L/B		
Hospital name, Mbarara Itojo	25(16.2) 4(7.7)	129(83.8) 48(92.3)	2.326(0.769-7.030)	0.126
Age group <20 20+	4 (16.7) 25 (14.6)	20 (83.3) 146 (85.3)	1.168(0.368-3.705)	0.792
Parity, Parous Prime gravida	24(19.0) 5(6.7)	102(81.0) 70(93.3)	3.294(1.199-9.048)	0.016
Mode of delivery, Vaginal Caeserean	25(29.1) 4(3.3)	61(70.9) 116(96.7)	11.885(3.956-35.707)	0.000
Birth weight(Kg), <3.0 3.0+	20(26.0) 9(7.9)	57(74.0) 105(92.1)	4.094(1.749-9.580)	0.001

The factors associated with fresh still births were vaginal mode of delivery with a p-value of < 0.001, OR (95% CI) 11.89 (3.26-35.71); birth weight of 3 or more kgs with a p-value of 0.001, OR (95% CI) 4.094(1.749-9.580) and multiparity with a p-value of 0.016, OR (95% CI) 3.29 (1.20-9.05).

DISCUSSION

Fetal outcome: The number of deliveries having babies with poor outcomes was highest among the group delivered by assisted vaginal breech as compared to those delivered by caesarean section (29.1% versus 3.3%). In a study by Min Su et al 2004, caesarean during early labor were associated with the lowest risk and vaginal birth was associated with the highest risk of adverse fetal outcomes (0.4% versus 2.2%). The poor outcomes are evidenced in the group of vaginal breech delivery group in both studies. The similarity in the fetal outcomes may be due to difficulties associated with vaginal breech delivery compared to caesarean section.

Apgar score 5 minutes: Babies born by C/S had better Apgar scores at 5 minutes with 5 (4.1%) of babies born through C/S scoring 0-6 while 115 (95.8%) scored between 7-10 whereas 31 (36%) of babies born by assisted vaginal breech delivery scored between 0-6 while 55 (64%) scored between 7-10. In a study by Poonam et al 2005, the babies born by vaginal breech had low Apgar scores compared to those born by pre-labor C/S (0.9% versus 5.9). The outcomes bear some similarity probably because both studies were done in a similar setting in that both hospitals provide comprehensive care.

Factors associated with poor outcome among breech deliveries: The factors associated with low Apgar scores at five minutes and fresh still births were vaginal mode of delivery, birth weight of less than 3 kilograms and multi-parity. The factors associated with poor fetal outcomes in both studies are similar because the studies were done in similar clinical settings. The vaginal breech delivery that was associated with poor fetal outcomes was also found in a study done in a similar clinical setting by Awo et al, 2000 in Nigeria. Poor fetal outcomes were also found in a study by Robilio et al in 2007 in California. This may indicate that these factors associated with poor fetal outcomes may be uniform in both low and high resource settings.

The birth weight of less than 3 kilograms that was associated with poor fetal outcomes was also found in studies by Sivakova et al., 2014 and Demirci et al., 2012. The reason for the poor fetal outcomes in babies with less than 3 kilograms could be due to inherent complications associated with prematurity such as respiratory distress and also vaginal mode of delivery.

There were more poor fetal outcomes in multiparous women because in our setting the practice is to deliver multiparous women by vaginal breech delivery compared to prime gravidas with breech presentation who are routinely delivered by elective cesarean section.

Maternal age: This study found low A/S to be higher among extremes of maternal age regardless of mode of delivery (22.7% among <20years and 38.9% among >35years, p-value 0.035). This could be due to unfavorable physiological and biological factors associates with extremes of maternal age

Conclusions: The rate of FSB among assisted breech delivery is high compared to C/S. The rate of low Apgar score at 1 minute is higher in assisted breech delivery group compared to C/S group. The rate of low A/S at 5 minutes is higher in assisted breech delivery group than C/S group. Rate of low A/S at 5 minutes was higher among babies born with weight <2.5kg compared to those >2.5kg.

Competing interests: Authors did not have any conflict of interest

Authors' contributions:

- 1: Mayanja Ronald.MD, Principal investigator, conceived the idea, developed the concept, involved in data collection, entry, analysis and manuscript writing
- 2: Masembe Sezalio.MD, involved in data collection, entry, analysis and manuscript writing
- 3: Nanzira Rachael. MD, data collection and manuscript writing
- 4: Njagi Joseph. MD, manuscript writing
- 5: Chakura Andrew. MD, manuscript writing
- 5: Ngonzi Joseph. MD, developed the concept, manuscript writing, research work mentorship and submission

Authors' information:

- 1: Mayanja Ronald, MBChB (MUST), MMed O&G(MU), Lecturer, Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda
- 2: Masembe Sezalio, MBChB (MUST), chief resident MMed Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda
- 3: Nanzira Rachael, MBChB (KIU), MMed O&G(MUST), Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda
- 4: Njagi Joseph, MBChB (MUST), chief resident MMed Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda
- 5: Chakura Andrew, MBChB (MUST), chief resident MMed Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda
- 6: Ngonzi Joseph, MBChB (MUST), MMed O&G(MUST), PhD candidate, Senior lecturer, Chair Department of obstetrics and Gynaecology, Mbarara University of Science and Technology, Uganda

Acknowledgements:

The respective administrations of Itojo district Hospital and Mbarara Regional Referral Hospital who allowed us to use patient's records to extract the data. We would also like to acknowledge the Research assistants who helped in extraction and recording of the data.

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