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Perinatal outcome and associated factors of persistent breech presentation at the Port Moresby General Hospital, Papua New Guinea

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SUMMARY

A study of 502 singleton persistent breech presentations and 502 controls of cephalic presentations during labour, at the Port Moresby General Hospital, was carried out from January 1988 to July 1993. In 76 (15%) of the cases, at least one attempt was made at external cephalic version. Backward logistic regression analysis showed that Momase or Islands region ethnicity, previous breech delivery, lack of antenatal care, preterm delivery, low birthweight and congenital anomalies were significantly associated with persistent breech delivery. The perinatal outcome of babies with breech presentation was worse than among babies with cephalic presentation.

Introduction

Breech presentation which persists to delivery occurs naturally in 2-4% of pregnancies. It is therefore not uncommon (1). During the study period, over 8500 babies were delivered yearly and the incidence of breech delivery was about 3% (2). Conditions that have been found to be associated with breech presentation include prematurity, polyhydramnios, oligohydramnios, cornuo-fundal insertion of the placenta, placenta praevia, uterine anomalies, high parity, congenital anomalies such as anencephaly and hydrocephaly, previous breech presentation and pelvic tumours. In the majority of cases, however, there are no obvious predisposing factors. Compared with vertex presentation, persistent breech presentation has increased hazard for both the mother and her baby.

At the Port Moresby General Hospital (PMGH), the common problems associated with breech presentation and delivery are cord prolapse, head entrapment, especially for preterm breeches, difficulties with the delivery of the after-coming head as a result of failure to recognize a rather big baby, fracture of the clavicles and intracranial injuries. Even though the proportion of breech deliveries at the PMGH is 3%, they account for 13% of perinatal deaths (2).

In order to improve these statistics, it is important to determine the causes of breech presentation in labour and study factors in the management of labour that contribute to the poor outcome. These problems encouraged us to perform this study.

Patients and Methods

Study objectives

i) To determine if the traditional risk factors for breech presentation were significantly associated with breech presentation in our community.
ii) To compare the perinatal morbidity and mortality in the cases and control groups

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and to see if modifications of our practice may improve the perinatal outcome.

Research design

This was a retrospective, unmatched, case-control survey.

Study population and subject enrolment

All deliveries at the PMGH are recorded in chronological order in the labour ward register (LWR). The study population consisted of singleton deliveries recorded in the LWR. The cases were breech presentations, whether delivered vaginally or abdominally. For each case the control was the first vertex vaginal or caesarean delivery entered in the LWR after the case. The cases and controls were enrolled sequentially. There was no matching because this study was designed to find as many variables as possible that make an impact on breech presentation and delivery in our practice.

The data sources were the LWR and patients' hospital records. The LWR was used to identify the cases and controls. The hospital records were then retrieved for study. All the hospital records were successfully retrieved. A standardized, pretested questionnaire was used to record the data.

Responses were treated as missing values in analysis if they had not been recorded in the hospital records.

From January 1988 to July 1993, 502 cases and 502 controls were studied.

Data analysis

The raw data were analyzed using the Epi Info Version 6 statistical package for univariate analysis (3). The Mantel-Haenszel chi squared and odds ratios were used for comparing the frequencies of categorical variables and the Kruskal-Wallis H test for comparing the means of continuous variables. Where it was necessary to test for interaction between covariates, backward logistic regression analysis was performed using the SPSS PC+ software (4). A difference was taken as statistically significant when the p value was less than 0.05 or the 95% confidence interval for the odds ratio did not include one.

TABLE 1

SOCIODEMOGRAPHIC CHARACTERISTICS AND PRESENTATION OF STUDY CASES AND CONTROLS

Variables	Cases		Controls		p value*	OR (95% CI)	
Categorical variables							
Southern region origin	54.6%	(274/502)	65.7%	(330/502)	<0.0002	0.63	(0.45-0.81)
Highlands region origin	17.9%	(90/502)	17.3%	(87/502)	0.80	1.01	(0.74-1.46)
Momase region origin	15.9%	(80/502)	9.4%	(47/502)	0.002	1.84	(1.23-2.74)
Islands region origin	11.6%	(58/502)	7.6%	(38/502)	0.032	1.60	(1.02-2.51)
Islands/Momase	27.5%	(138/502)	16.9%	(85/502)	0.00006	1.86	(1.36-2.55)
Height <150 cm	4.6%	(18/390)	6.4%	(28/437)	0.26	0.71	(0.37-1.35)
Age <20 years	14.3%	(71/497)	6.4%	(31/488)	0.0004	2.46	(1.55-3.92)
Age >35 years	8.0%	(40/497)	6.4%	(31/488)	0.30	1.29	(0.77-2.16)
Continuous variables							
Mean height cm (SD)	159.3	(±6.48)	159.2	(±6.65)	>0.10		
Mean age years (SD)	25.6	(±6.00)	25.4	(±5.66)	>0.56		

* The p values for categorical and continuous variables are based on Mantel-Haenszel χ^2 and Kruskal-Wallis H tests respectively

OR = odds ratio CI = confidence interval SD = standard deviation

TABLE 2

PAST OBSTETRIC CHARACTERISTICS AMONG CASES AND CONTROLS

Variables	Cases	Controls	p value*	OR (95% CI)
Categorical variables				
Parity group				
Para 0	34.5% (173/502)	27.5% (138/502)	0.009	1.43 (1.08-1.88)
Para 1-4	55.8% (280/502)	63.1% (317/502)	0.017	0.74 (0.57-0.96)
Para >4	9.8% (49/502)	9.4% (47/502)		
Comparison of para 0 and para >4 risk groups with para 1-4 as a reference group				
Para 0 vs Para 1-4				
Para 0	38.2% (173/453)	30.3% (138/455)		
Para 1-4	61.8% (280/453)	69.7% (317/455)	0.01	1.42 (1.07-1.89)
Para >4 vs Para 1-4				
Para >4	14.9% (49/329)	12.9% (47/364)		
Para 1-4	85.1% (280/329)	87.1% (317/364)	0.45	1.18 (0.75-1.86)
Others				
Past perinatal death	7.4% (37/502)	6.6% (33/502)	0.35	0.88 (0.53-1.48)
Past breech delivery	8.8% (44/502)	1.6% (8/501)	0.000001	5.49 (2.46-12.75)
Past caesarean section	4.0% (20/502)	2.0% (10/502)	0.06	2.04 (0.90-4.73)
Continuous variable				
Mean parity (SD)	1.8 (±1.91)	1.8 (±1.74)	0.10	

*The p values for categorical and continuous variables are based on Mantel-Haenszel χ^2 and Kruskal-Wallis H tests respectively
OR = odds ratio CI = confidence interval SD = standard deviation

Results

In 76 (15%) of the 502 cases, at least one attempt at external cephalic version (ECV) was made.

Sociodemographic characteristics

Table 1 shows the sociodemographic characteristics of the cases and the controls. Most of the subjects were of Southern region ethnicity. The Southerners had the lowest occurrence of persistent breech presentation while Islanders and Momase subjects had the highest. There was no significant difference between the cases and controls as far as height was concerned but age less than 20 was significantly associated with breech presentation.

Past obstetric characteristics

Table 2 show the past obstetric characteristics. Nulliparae (para 0) had a significantly higher risk of persistent breech than para 1-4 subjects. Grand multiparity (parity >4), a history of past perinatal death or of past caesarean section did not have any association with persistent breech presentation in the index pregnancy, but past breech delivery was significantly associated with persistent breech presentation in the index pregnancy.

Index pregnancy and delivery characteristics

Table 3 shows the index pregnancy and delivery characteristics. A significantly

TABLE 3

INDEX PREGNANCY AND DELIVERY CHARACTERISTICS

Variables	Cases	Controls	p value*	OR (95% CI)
Categorical variables				
Antenatal care	82.9% (416/502)	94.0% (472/502)	0.0000005	0.31 (0.19-0.49)
Elective caesarean section	7.8% (39/502)	1.2% (6/502)	0.0000005	6.96 (2.79-18.46)
Elective and emergency caesarean sections	20.9% (105/502)	4.4% (22/502)	0.0000000	5.77 (3.50-9.59)
Preterm delivery	43.3% (215/496)	13.7% (66/482)	0.0000000	4.82 (3.48-6.69)
Continuous variables				
Mean (SD) gestational age at first antenatal visit	24.6 (±7.80)	27.2 (±7.10)	0.000001	
Mean (SD) gestational age at delivery	35.1 (±4.96)	38.4 (±2.15)	0.0000001	

*The p values for categorical and continuous variables are based on Mantel-Haenszel χ^2 and Kruskal-Wallis H tests respectively
OR = odds ratio CI = confidence interval SD = standard deviation

TABLE 4

LABOUR CHARACTERISTICS AMONG CASES AND CONTROLS WHO WERE NOT DELIVERED BY ELECTIVE CAESAREAN SECTION

Variables	Cases	Controls	p value*	OR (95% CI)
Categorical variables				
Labour induced	1.9% (9/462)	2.2% (11/496)	0.77	0.88 (0.33-2.30)
Action line crossed	5.2% (24/458)	5.6% (28/496)	0.78	0.92 (0.51-1.68)
Labour augmented	2.2% (10/458)	7.5% (37/496)	<0.0002	0.28 (0.13-0.59)
Delivery conducted or supervised by the most senior HW	39.7%(184/463)	5.6% (28/496)	0.0000001	11.02 (7.08-17.25)
Birthweight <2500 g†	39.0%(196/502)	6.8% (34/502)	0.0000000	8.82 (5.87-13.31)
Continuous variables				
Mean (SD) birthweight (g)	2509.6 (±966.3)	3196.8 (±520)	0.000000	
Mean (SD) total duration of labour in hours	10.3 (±8.61)	10.5 (±6.29)	0.05	

*The p values for categorical and continuous variables are based on Mantel-Haenszel χ^2 and Kruskal-Wallis H tests respectively
†All babies included
OR = odds ratio CI = confidence interval HW = health worker SD = standard deviation

TABLE 5

AFTER LOGISTIC REGRESSION ANALYSIS THE INDEPENDENT VARIABLES THAT WERE SHOWN TO BE SIGNIFICANTLY ASSOCIATED WITH PERSISTENT BREECH PRESENTATION

Independent variables	-2 LLR	df	Significance of LLR
Lack of antenatal care	7.932	1	0.0049
Low birthweight	49.160	2	0.0000
Congenital anomaly	7.601	1	0.0058
Momase/Islands region ethnicity	13.512	1	0.0002
Preterm delivery	12.595	2	0.0018
Previous breech delivery	34.632	2	0.0000

LLR = log likelihood ratio
df = degrees of freedom

smaller proportion of the cases had attended antenatal clinic in this pregnancy. Among the attenders, the mean gestational age (GA) at the first visit and at delivery was significantly lower among the cases. More of the cases were delivered preterm, and also a greater proportion were delivered by caesarean section.

Labour characteristics

Table 4 shows the labour characteristics (elective caesarean sections excluded). The proportion of subjects in whom labour was induced and the proportion of labours in which the action line of the partograph was crossed were similar among cases and controls. However, there were some differences between the cases and controls. Labour was augmented less frequently in the cases than in controls, the mean duration of labour in the controls was slightly longer than in the cases, more of the cases who delivered vaginally had their deliveries performed or supervised by a specialist medical officer or a registrar (specialist-in-training) and the babies of the cases were lighter than those of the controls.

Logistic regression analysis

When variables that were significantly associated with breech presentation were reassessed using logistic regression analysis some of them remained significantly associated with breech presentation. These were the lack of antenatal care, low birthweight, congenital anomaly, Momase/Islands region ethnicity, preterm delivery and previous breech delivery (Table 5).

Outcome for babies

Table 6 shows the outcome for the babies (elective caesarean sections were excluded from this analysis). About 20% of the babies of the cases were admitted to the Special Care Nursery (SCN) compared with about 3% of the babies of the controls. But when only the babies who stayed more than 2 days were examined, there was no difference between the two groups. There were significantly more babies with congenital anomalies in the cases group than in the controls (3.8% vs 0.4%). The cases had lower Apgar scores and there were more stillbirths, neonatal deaths and perinatal deaths among the cases than the controls.

Discussion

In the great majority of breech presentations there is no demonstrable cause, although some conditions are well-known to be associated with this condition. In this study, univariate analysis showed the following factors to have significant association with persistent breech presentation: Momase or Islands region ethnicity, age less than 20 years, nulliparity, past breech delivery, lack of antenatal care, preterm delivery (GA <37 weeks), low birthweight (<2500 g) and congenital anomaly.

TABLE 6

THE OUTCOME OF BABIES WITH PERSISTENT BREECH PRESENTATION IN COMPARISON TO CONTROLS

Variables	Cases	Controls	p value*	OR (95% CI)
Categorical variables				
Apgar score <6 at 1 minute†	27.1% (88/325)	1.7% (7/403)	0.0000000	21.0 (9.2-50.4)
Apgar score <6 at 5 minutes	7.3% (24/329)	0.2% (1/403)	<0.0000002	31.6 (4.54-631.9)
Admission to SCN‡	19.7% (91/463)	2.6% (13/496)	0.0000000	9.09 (4.86-17.32)
Stay in SCN for 1-2 days	90.1% (82/91)	15.4% (2/13)	0.0000000	50.11 (8.31-394)
Stay in SCN >2 days	67.0% (61/91)	84.6% (11/13)	0.2	0.37 (0.05-1.95)
Congenital anomaly	3.8% (19/502)	0.4% (2/502)	0.0002	9.83 (2.20-61.41)
Stillbirth in this pregnancy	18.5% (93/502)	1.2% (6/502)	0.0000000	18.8 (7.7-48.1)
Early neonatal death in this pregnancy	8.8% (44/502)	0.6% (3/502)	0.0000000	15.98 (4.75-64.90)
Perinatal death in this pregnancy	27.1%(136/502)	1.8% (9/502)	0.0000000	20.35 (9.9-43.3)
Continuous variables				
Mean (SD) Apgar score at 1 minute	5.3 (±3.40)	9.4 (±1.62)	<0.000001	
Mean (SD) Apgar score at 5 minutes	7.1 (±4.10)	9.8 (±1.26)	<0.000001	

*The p values for categorical and continuous variables are based on Mantel-Haenszel χ^2 and Kruskal-Wallis H tests respectively
†Caesarean deliveries were excluded
‡Elective caesarean deliveries were excluded
OR = odds ratio CI = confidence interval SCN = special care nursery SD = standard deviation

However, when backward logistic regression analysis was used, nulliparity and age less than 20 years showed no independent association with persistent breech presentation. With respect to uterine anomalies, there were only two overall, and both were found among the cases.

Although throughout the third trimester cephalic presentation is the rule, the less the gestational age, the higher the proportion of babies that present by the breech. Using ultrasound scanning, it has been shown that at 25-28 weeks gestation about 28% of babies present by the breech; at 29-32 weeks the proportion is 14%, at 37-40 weeks 7% and at delivery 2-4% (5,6). The association of preterm birth and breech presentation was confirmed in this study. The breech babies were born significantly earlier than the controls; their mean birthweight was much less than the controls; and many more of the cases weighed less than 2500 g.

Traditionally, grandmultiparity has been associated with breech presentation. The explanation for this association is that high parity produces laxity of the uterus and of the abdominal muscles (7). These muscles therefore are unable to 'splint the fetus in place'. However, it may be argued that by the same token it should be easy for the fetus, either spontaneously or with the help of external version, to assume the vertex presentation again. High parity should not therefore predispose to persistent breech presentation. In our study parity was not associated with breech presentation.

The frequency of fetal anomalies was significantly higher in the cases than in the controls, which is in agreement with previous studies. For example, Brenner et al. found the incidence of congenital anomalies to be 2.4% in cephalic presentation and 6.3% among breech deliveries (8). The common intrauterine and fetal anomalies which have been associated with breech presentation are polyhydramnios, oligohydramnios, anencephaly and muscular and neurological diseases which reduce the fetus' ability to turn in utero. Cornuo-fundal insertion of the placenta has also been associated with breech presentation (9,10). Placental insertion, however, could not be assessed in this study because only one of the controls had sonographic placentography in late pregnancy.

Previous breech presentation is a known predisposing factor for persistent breech presentation (7,11) and this was confirmed in our study. The condition that allowed for breech presentation in the first place is likely to persist into subsequent pregnancies.

Vaginal delivery of a persistent breech was more likely to be attended or supervised by a senior health worker rather than by a resident medical officer or a midwife. This is in line with our labour ward policy designed to reduce intrapartum morbidity to a minimum. The factors that are taken into consideration in deciding on abdominal delivery include breech presentation first diagnosed in labour, especially in patients who have not received any antenatal care and particularly if the type of breech is complete or footling, and desultory labour, especially when the action line is crossed. In these patients no attempt is made to augment labour except in the very rare case when nonprogressive labour is assessed to be truly due to poor uterine activity. When augmentation is decided upon, it should be performed under strict supervision. If such close supervision is unavailable then abdominal delivery is mandatory.

In the absence of polyhydramnios, fundal height of 38 cm or more is another indication for abdominal delivery at the PMGH. Fundal height of 38 cm or more has been shown for our practice to be the most useful value of symphysis fundal height for predicting high birthweight (J. Novette, A.B. Amoa and C.A. Klufio, unpublished data, 1995). The above indications for abdominal delivery are consistent with the practice at the PMGH, where all grades of labour ward attendants are encouraged to follow a standard protocol. Usually there are not very many deviations from this protocol. Personal preferences and differences are therefore reduced to a minimum.

Because of the above concerns for breech presentation it was not surprising that the cases were more likely to have caesarean section. In many centres breech presentation in labour, especially the flexed breech, would mandate caesarean section. By choosing abdominal delivery, attendants may be trying to reduce the increased perinatal morbidity and mortality associated with vaginal breech delivery (6,12). Sometimes, however, the rationale for this is to avoid undue litigation.

At the PMGH we allow many patients, especially those with frank breech, to proceed in labour in the hope that this will prove to be progressive. Labour is monitored with the help of the partograph and any deviation from the normal would usually result in abdominal delivery. Our caesarean section rate for breech deliveries is therefore much lower than that of many first world centres. At the PMGH breech presentation as a sole indication for abdominal delivery constitutes 8% of all indications (2). In many other centres the proportion is higher. For example, at the King George V Hospital in Sydney, Australia, the proportion of caesarean sections for breech presentation was 17.2% (13). The choice of route of delivery is important in our practice. Morbidity and mortality from caesarean sections are considerable. Moreover, subsequent deliveries may not always be conducted at an institution equipped to perform urgent operations and at times the delivery may not even be supervised at all.

The mean total duration of labour was a little longer in the controls than in the cases (10.5 vs 10.3 hours). Although this may be interpreted to mean that labour attendants would not allow breech labour to go on for as long as they would allow vertex labour, the difference (though statistically significant) was too small to state this with any confidence and was of no clinical significance.

Compared with vertex presentation, persistent breech presentation has increased hazard for both the mother and her baby. However, the risks to the baby are much greater. The more frequent operative and nonoperative interventions performed for breech delivery are the main reasons for the higher perinatal and maternal morbidity rates in breech presentation. The overall perinatal mortality in breech delivery is 4 to 10 times that of vertex delivery (6,12). Previous studies have found the important causes of the high perinatal morbidity and mortality to be prematurity, congenital anomalies, and mechanical and hypoxic damage during birth. After correcting for prematurity and congenital anomalies, the perinatal morbidity and mortality of breech deliveries are still considerably higher than the rates in cephalic deliveries.

Some of the complications responsible for the excess morbidity and mortality are as follows:

i) *Traumatic delivery*

The commonly injured organs are the brain, spinal cord, liver and adrenal glands (14). Less frequently, fractures of the femur and humerus or separation of their epiphyses and pharyngeal tears caused by the birth attendant's finger have been reported. At the PMGH the common injuries associated with breech deliveries include intracranial and brachial plexus injuries, fractures of the clavicle and injury to the scrotum and testes.

ii) *Mechanical asphyxia*

The experience at the PMGH shows that entrapment of the after-coming head by the not fully dilated cervix, disproportion, cord prolapse and premature separation of the placenta are the major causes of asphyxia. Cord prolapse and cord entanglement in footling breech have been shown to be common causes of asphyxia among breech presentations (15,16) in addition to placenta praevia and unassisted delivery before arrival in hospital.

Significantly more vaginally delivered breech babies than vertex babies were admitted to the SCN, but when those babies who stayed in the SCN for more than 2 days were considered, there was no difference between the two groups. This would suggest that most of the breech babies were admitted for observation only, rather than for a diagnosed complication. The stillbirth, early neonatal and perinatal death rates were all significantly higher in the cases than in the control group. This is in agreement with other studies (16,17). At the PMGH the stillbirth rate is 24/1000 births whilst the neonatal mortality rate is 20/1000 livebirths. The contribution of breech births to these figures is enormous since breeches contribute 13% to the perinatal mortality in spite of the fact that they constitute only 3% of all deliveries (2).

Traditionally meconium staining of the liquor during labour with the head presenting has been regarded as ominous for the baby. It usually indicates some asphyxial insult. Electronic monitoring supported by blood gases analysis, when available, will determine the need for immediate intervention. With breech presentation, however, there are usually doubts as to whether the meconium passage is due to abdominal compression or an asphyxial insult. Unless the breech has descended deeply into the pelvis, any meconium passage is likely to be due to asphyxia until proven otherwise. At the PMGH intensive fetal heart monitoring using both the stethoscope and intermittent electronic monitoring is instituted. In the absence of reassurance that all is well with the baby, meconium staining of the liquor in early labour will constitute an urgent indication for caesarean section.

Two unexpected findings need to be commented upon. The first is the fact that an attempt at external cephalic version (ECV) was made in only 15% of the 502 cases. This is a very low rate in view of the protocol that we follow at the PMGH. ECV is routinely performed on most breech presentations in our clinics. In many cases we perform this procedure several times. Since 86 patients did not attend antenatal clinic the proportion who underwent ECV among the antenatal attendants was in fact 18%. This is still low and means that many of our patients who attend urban clinics (45%) may not be appropriately referred to the medical staff. On

the other hand some medical staff may not be following the protocol laid down for guidance in the management of patients. ECV at term has been associated with a reduction of breech presentation at labour. If need be it should be performed under tocolysis.

The second unexpected finding was that individuals from the Momase and Islands regions had an increased risk of breech presentation, even after multiple logistic regression analysis. We have no explanation for this. A matched prospective study of breech presentation during pregnancy and labour would be required to investigate this question further.

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