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Mechanical Birth Trauma – An Evaluation of Predisposing Factors at the Ogun State University Teaching Hospital, Sagamu

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Summary

Njokanma OF, Kehinde O. Mechanical Birth Trauma – An Evaluation of Predisposing Factors at the Ogun State University Teaching Hospital, Sagamu. *Nigerian Journal of Paediatrics* **2002; 29:61.** Fifty neonates were identified in a study carried out to determine the factors predisposing to mechanical birth trauma in neonates at the Ogun State University Teaching Hospital, Sagamu. Data were collected retrospectively from 1989 to 1990 and prospectively from 1991 to 1994. The incidence of mechanical birth trauma among inborn babies was 9.17 per 1000 live births. Non-booked deliveries were at a higher risk for birth trauma than booked ones (χ^2 = 14.03, p < 0.01). The common injuries encountered were scalp haemorrhage, fractures and nerve palsies. Birth weight above 4000g was associated with a higher risk of birth trauma than the reference group weighing 2500 – 2999g (odds ratio = 10.17, 95% confidence limits = 2.02 – 51.2). Five of eight cases of fractures occurred following breech delivery, and three (37.5 percent) occurred in preterm, very low birth weight retained second twins or triplets. Forty four percent of all cases suffered concomitant severe birth asphyxia. It is recommended that greater effort be made through health education to encourage early presentation or referral to centres capable of handling high-risk cases and improvement of facilities at those centers. A cautious approach to Caesarean section for delivering very low birth weight twins is advocated vis-à-vis available facilities for intensive neonatal care and therefore, chances of survival.

Introduction

BIRTH injuries may be asphyxial or mechanical in nature and in some cases, may be predictable and preventable.[1] Successful prevention often depends on evaluation of each pregnancy in the light of potential predisposing factors to birth injury.[2] However, there is no uniform agreement on the role of specific factors. For instance, while some workers feel that macrosomia and breech delivery predispose to birth trauma,[3,4] others do not agree.[5,6] Such disagreements represent inter-centre differences in experience. More importantly, they emphasise the need for regular review of cases within any given obstetric service or region vis-à-vis perinatal circumstances and practices. This will enhance detection of any adverse perinatal circumstance or deficiency that may predispose to birth trauma.

We present a series of neonates who sustained various forms of mechanical birth trauma. The aim was to identify and analyse factors predisposing to these injuries and to propose measures that might reduce their incidence.

Patients and Methods

The study was conducted at the Ogun State University Teaching Hospital (OSUTH), Sagamu, between March 1989 and June 1994. The clinical records of all babies born at OSUTH, those referred from other centres and admitted to the Special Care Baby Unit and others presenting at the Neonatal Outpatients Clinic, were examined. All neonates who presented with mechanical birth injuries were identified and included in the study. Data were collected in two parts: retrospectively from March 1989 to December 1990 and prospectively from January 1991 to June 1994. Infant data collected

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included gestational age (weeks), birth weight (g), mode of delivery, place of delivery, nature of birth injury sustained, and final outcome (dead or alive). Maternal data consisted of pre-delivery booking status, age and parity. Other observations made were events in the clinical course of the babies such as the presence of birth asphyxia or other morbidities. Cases of caput succedaneum, reputedly the commonest and least problematic of birth injuries were excluded.

The data were analysed using chi-square χ^2 tests for discrete data and calculation of odds ratios with 95% confidence limits. Statistical significance was established if probability (p) value associated with χ^2 was < 0.05 or 95% confidence limits did not embrace unity (the numeral 1).

Results

Fifty babies with various types of mechanical birth trauma were seen during the study period. Of these, 33 (66 percent) were male and 17 (34 percent) female. Twenty seven (54 percent) were born at OSUTH giving an incidence of 9.17 per 1000 for 2943 live births. Further analysis showed that the prevalence among 2293 booked deliveries was 5.67 per 1000 (13 patients) and this was significantly lower than the 21.54 per 1000 (14 patients) for the 650 non-booked deliveries ($\chi^2=14.03$, $p< 0.01$). Of the 23 referred subjects, eight (34.8 percent) were born in private hospitals, six (26.1 percent) at private maternity homes, three (13 percent) at home and two (8.7 percent) at a traditional birth attendant's home: in four (17.4 per cent) cases, the place of birth was not stated.

The various types of birth trauma are shown in Table I. The commonest injury was cephal-haematoma in 17 (34 percent) cases, followed by Erb-Duchenne palsy (seven cases) and fracture of the femur (four cases). The mean birth weight of 48 study subjects for whom data were available was 3064 ± 838g with a range of 900g to 5100g. Table II shows the birth weight specific incidence of birth trauma for inborn babies: the highest incidence and odds ratios were associated with birth weight ≥4000g and these were significantly higher than for the reference group weighing between 2500g and 2999g. Overall, six cases (28.6 percent) of scalp haemorrhage and three (50 percent) of brachial plexus palsy occurred in infants who weighed >3500g at birth. Also, three (37.5 percent) of those who sustained fractures weighed <1500g.

Among inborn babies, the risk of birth trauma was significantly higher with breech, vacuum or Caesarean delivery than with spontaneous vertex delivery (Table III). The injuries sustained were directly intrinsic to the mode of delivery in four cases of vacuum extraction (scalp ulceration) and four cases of Caesarean section (accidental incision). All babies affected were delivered at OSUTH by senior registrars

Table I

Types of Birth Injury in 50 Neonates

Type of Injury	*Inborn* *n = 27*	*Referred* *n = 23*	*All Subjects* *n = 50*
Haemorrhagic	10 (37.0)	15 (65.2)	25 (50)
Cephalhaematoma	8 (29.6)	9 (39.1)	17 (34)
Subaponeurotic haemorrhage	2 (7.4)	2 (8.7)	4 (8)
Haemoperitoneum	-	2 (8.7)	2 (4)
Haematoma (into the thigh)	-	1 (4.3)	1 (2)
Subarachnoid haemorrhage	-	1 (4.3)	1 (2)
Fractures	2 (7.4)	6 (26.1)	8 (16)
Femur	1 (3.7)	3 (13.0)	4 (8)
Clavicle	-	2 (8.7)	2 (4)
Humerus	-	1 (4.3)	1 (2)
Skull	1 (3.7)	-	1 (2)
Nerve palsies	4 (14.8)	3 (13)	7 (14)
Erb-Duchenne	3 (11.1)	2 (8.7)	5 (10)
Klumpke	1 (3.7)	-	1 (2)
Facial	-	1 (4.3)	1 (2)
Accidental incisions	4 (14.8)	-	4 (8)
Scalp ulceration	4 (14.8)	-	4 (8)
Oedema of abnormally presenting part	3 (11.1)	-	3(6)

One patient presented with haematoma into the right thigh and fracture of the humerus.
Figures in parentheses are percentages.

Table II

Birth Weight-specific Incidence of Birth Trauma among Inborn Babies

Birth Weight (g)	*Live Births*	*Number Affected*	*Incidence (Percent)*	*Odds ratio*	*P-value*
<2500	437	4	0.92	2.63 (0.59 – 11.79)	> 0.05
2500 – 2999	856	3	0.35	1.00*	
3000 – 3499	1104	13	1.18	3.34 (0.96 – 11.93)	> 0.05
3500 – 3999	459	4	0.87	2.50 (0.56 – 11.20)	> 0.05
≥ 4000	87	3	3.37	10.17 (2.02 – 51.2)	< 0.01

*Standard risk group

Table III

Incidence of Birth Trauma in Relation to the Mode of Delivery of Inborn Babies

Mode of Delivery	*Live Births*	*Number Affected*	*Incidence (Percent)*	*Odds ratio*	*P-value*
Spontaneous vertex	2290	7	0.31	1.00*	
Vacuum extraction	202	8	3.96	13.5 (4.8 – 37.5)	< 0.001
Caesarean section	325	10	3.08	10.4 (3.9 – 27.4)	< 0.001
Breech delivery	124	2	1.61	5.35(1.1 – 26.0)	< 0.05

* Standard risk group
Figures in parentheses are the 95% confidence limits.

Table IV

Contributory Factors to Mortality in 14 Subjects

*Contributory Factor**	*All Cases n = 14*	*Inborn Babies n = 5*
Severe birth asphyxia	10 (17.1)	4 (80)
Low birth weight	6 (42.9)	2 (40)
Severe anaemia	5 (35.7)	2 (40)
Breech delivery	4 (28.6)	1 (20)
Vacuum extraction	3 (21.4)	1 (20)
Hypoglycaemia	3 (21.4)	2 (40)
Septicaemia	2 (14.3)	1 (20)
Meningitis	2 (14.3)	2 (40)
Hypothermia	2 (14.3)	1 (20)
Necrotizing enterocolitis	1 (7.1)	1 (20)

* Some patients had more than one factor
Figures in parentheses are percentages

or consultant obstetricians. When the incidence rates were adjusted to exclude these cases, the incidence figures for vacuum extraction dropped from 3.96 percent to 1.98 percent while that of Caesarean section dropped from 3.08 percent to 1.85 percent.

About one quarter (five of 21 cases) of scalp haemorrhages occurred with vacuum extraction and more than 60 percent (five of eight cases) of fractures, with breech delivery. Two of five cases of fracture who were delivered by breech extraction, were born at OSUTH by obstetric senior registrars: one of the babies weighed <1500g. The other three, two of whom weighed <1500g, were delivered by private general medical practitioners. There was no significant relationship between the incidence of birth trauma and maternal age or parity.

In addition to mechanical trauma, 22 (44 percent) babies suffered severe birth asphyxia, six (12 percent) had moderate asphyxia, six (12 percent) had mild asphyxia, seven (14 percent) no asphyxia and in nine cases, it was not stated whether the babies were asphyxiated or not. Of the 22 babies that suffered severe birth asphyxia, 15 (68.2 per cent) were inborn, three of whom were booked deliveries and 12, non-booked. The concurrence rate of mechanical injury with severe asphyxia was significantly higher for non-booked deliveries than booked ones (12 of 14 vs 3 of 13, odds ratio = 20.00, 95% confidence limits = 2.77 – 144.3).

Fourteen subjects (28 percent) died; five of these were inborn and nine (64.3 percent) were referred. Two (40 percent) of the five inborn fatal cases were non-booked emergency deliveries. Of the overall 14 fatal cases, nine (64.3 percent) had haemorrhagic injuries, three (21.4 percent) had limb fractures and

one each (7.1 percent) had Erb palsy and severe facial oedema. Severe birth asphyxia, low birth weight and severe anaemia were among the leading causes of death as shown in Table IV.

Discussion

The range of injuries encountered during the study, is similar to that previously reported elsewhere. [1,7-10] There are however, variations in the relative frequencies of specific injuries. While haemorrhagic injuries were commoner than fractures and nerve palsies in our series and that of Mukasa,[10] other workers have reported brachial plexus injuries[7] or fractures [8,9] with far greater frequency. The reasons for these differences are not clear but they may reflect variations in local obstetric practices. For instance, a centre that favours forceps deliveries is more likely to report facial nerve palsies than others.

Among inborn subjects in our series, there was a strong association between the incidence of mechanical birth trauma and non-booked delivery. The concurrence rate of mechanical and asphyxial insult was also higher among non-booked than booked subjects. Bhat *et al*[2] had earlier noted the coexistence between asphyxial and mechanical birth trauma and identified lack of antenatal care as a common aetiological factor. The obvious inference is that the non-booked women presented late and in relatively poor states of health. It is therefore attractive to recommend early presentation or referral of high-risk cases to centres capable of handling them. This must also be supported by good quality services at the referral centres so as to have a reducing impact on the incidence of birth trauma.

With regard to the mode of delivery, our findings are similar to those of Benjamin and Khan[7] who implicated vacuum extraction, and with those of Boo *et al*[11] and Gifford *et al*[12] which identified breech delivery in the aetiology of birth trauma. In our study also, breech extraction accounted for more than 60 percent of the fractures, most of which occurred in preterm, very low birth weight retained twins or triplets. Other workers[6] have also reported the predisposition of preterm, low birth weight infants to fractures. This brings to focus, the mode of delivery that is most suitable for tiny infants, particularly those presenting as breech. Various factors, including economic issues and the likelihood of the baby surviving, are considered in arriving at a decision. Gifford *et al*,[12] in a meta-analysis, found lower perinatal morbidity and mortality when Caesarean delivery was performed for breech presentation. Persad *et al*[13] reported a 2.5 to 5-fold reduced risk of poor outcome when preterm, low birth weight babies were born by Caesarean rather than by the vaginal route. In their own study, Barrett *et al*[14] proposed Caesarean section as the optimal route of delivery for all twins expected to have a birth weight less than 1500g. On the other hand, Sanchez-Ramos *et al*,[15] in a study of singleton breech presentations found that trial of labour and vaginal delivery had comparable neonatal outcome with Caesarean section; the study however, involved babies of at least, 34 weeks' gestation. Maudlin *et al*[16] examined hospital charges alongside clinical data and found breech extraction of twins presenting breech to be the more cost-effective option.

The recommendation of Caesarean delivery for very low birth weight babies should be accepted with caution in our circumstances. Whilst the risk of mechanical birth injuries and other morbidity may be reduced by operative delivery, lack of facilities may militate against eventual survival. Thus, in addition to the scar and trauma of surgery to the mother, a poor neonatal outcome is still possible. At the other end of the weight spectrum, increasing birth weight was strongly associated with the overall incidence of birth trauma as well as with specific injuries like scalp haemorrhages and brachial plexus palsies. We recommend routine antenatal estimation of expected birth weight in relation to pelvic size. This should help the obstetrician decide the most appropriate mode of delivery on an individualised basis. Whichever mode of delivery is adopted, the skill and experience of the attending personnel should be considered.

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