Mechanical Birth Injuries in the Niger Delta: A Ten-Year Review (1989-1998).

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Abstract

Context: Birth traumas associated with poor obstetric services contribute significantly not only to the high perinatal morbidity and mortality, but also to long-term sequelae in the survivors in many developing countries. Birth asphyxia, one of the commonest sequelae of such injuries, has remained a common cause of neonatal deaths in this setting. These injuries however remain under-reported, hence this report.
Objectives: To determine the incidence, types and associated factors in mechanical birth injuries in babies delivered at the University of Port Harcourt Teaching Hospital (UPTH) in the Niger Delta from January 1989-December 1998.
Design: A retrospective analysis of hospital records of deliveries during the study period.
Setting: The Labour and Isolation Wards for delivery records and the Special Baby Care Unit's records on UPTH-delivered babies.
Subjects and Methods: All mother-baby pairs delivered at UPTH during the study period were studied. For each mother-baby pair the following data were obtained: biodata, obstetric records and examination findings on the babies. Further analysis was on neonates with mechanical birth traumas. Fisher's Exact and Chi square tests were used for data analysis.
Results: Of 16, 631 livebirths, 50 babies had mechanical birth injuries, giving an incidence of 3.1/1000 livebirths. Mechanical birth injuries were commoner in normal weight, term male babies, whose mothers were unbooked and or nulliparous. The common injuries were cephalhaematoma (48%), Erbs' palsy (14%) and facial ecchymoses.
Conclusions: Mechanical birth injury remains a problem in this setting. The contributory factors to birth injuries were similar to those in other developing countries.

Key Words: *Mechanical Birth Injuries, Niger Delta.* [Trop J Obstet Gynaecol, 2005, 22: 50-55]

Introduction

The term birth injury or trauma is used to denote avoidable and unavoidable mechanical (non-asphyxial) and anoxic trauma suffered or sustained by an infant during labour and delivery. These injuries may result from inappropriate or deficient medical skill or attention or they may occur despite skilled and competent obstetric care, independent of any acts or omissions of the caregivers.
The incidence of birth injuries has been estimated at 2-7 per 1000 livebirths[1]. Although the incidence has decreased in recent years, in part owing to refinement in obstetric techniques and judgment, birth injuries still represent an important problem for clinicians because even transient problems are frequently readily apparent to the parents and result in anxiety and questions that require supportive and informative counselling, Some injuries may be latent initially, but later result in severe illness or sequelae.

Successful prevention of birth injuries often depends on the evaluation of each pregnancy during antenatal and perinatal care in the light of potential predisposing factors[2]. There is however no uniform agreement on the role of specific factors[3]. For instance, while some workers feel that foetal macrosomia and breech delivery predispose to birth trauma [4, 5], others do not agree [6,7]. Such inter-centre variations in observation are not unusual and may represent local factors difficult to compare. More importantly, they emphasise the need for regular review of causes within any given obstetric service or region.

Despite the fact that birth injury or trauma is a major problem in the tropics[8], it is grossly under-reported. This study reviews identifiable mechanical birth trauma amongst live births over a ten-year period at the University of Port Harcourt Teaching Hospital with the aim of identifying predisposing factors. The hospital has 51 obstetric beds. The delivery capacity of the unit is between 1500 and 2500 per annum. The hospital provides care at the primary, secondary and tertiary levels, hence all pregnant and puerperal patients presenting at the centre, receive attention. Unbooked patients who present in labour or puerperium are admitted into the Isolation Ward. Emergency admission is through the Casualty Department or Isolation Ward for booked and unbooked patients respectively. The unit has separate wards for antenatal, labour and postnatal patients. The Paediatric Department of the hospital provides care for newborns delivered at the centre and those from outside. Such

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babies, except those with neonatal tetanus are admitted into the 19-bedded Special Care Baby Unit (SCBU).

Subjects and Methods

This was a retrospective study involving livebirths with non-asphyxial (mechanical) birth trauma at the University of Port Harcourt Teaching Hospital between 1st January 1989 and 31st December 1998, a period of ten years. Data were collected from the delivery Registers in the Labour Ward and Isolation Ward, the admission registers of the Special Care Baby Unit and the folders of non-asphyxial birth-injured babies and their mothers. Data collected from these records included maternal age, parity, booking status, gestational age, mode of delivery, birth weight, sex of the baby and the types of birth injuries. Other information obtained included the anthropometry of the mothers (weight and height), their socio-economic status and duration of labour. Children included in the analysis were those delivered in the hospital. Children who had caput succedaneum, internal injuries and intracranial haemorrhage were excluded from analysis because of the difficulty of confirming the diagnoses of these conditions in a retrospective study. The mothers were classified as booked or unbooked for analysis. A booked mother is one who registered and had her antenatal care and labour in University of Port Harcourt Teaching Hospital. An unbooked mother was one whose first visit to the teaching hospital was her emergency admission in labour.

Statistical analysis was with Chi Square Test and Fisher's Exact Test. A p value of 0.05 or less was considered statistically significant.

Table 1

Yearly Incidence of Mechanical Birth Injuries

Year	Total Livebirths	Booked	Unbooked	No of Babies With Birth Injuries	Incidence of Birth Injuries/1000 livebirths
1989	2036	1836	200	11	5.40
1990	901	757	144	5	5.55
1991	2178	1973	205	7	3.21
1992	2008	1773	235	7	3.49
1993	1669	1525	144	5	3.0
1994	1393	1191	202	4	2.87
1995	1451	1365	86	3	2.06
1996	1107	1059	48	2	1.81
1997	1635	1469	166	3	1.83
1998	2253	2020	233	3	1.33
Total	16631	14968	1663	50	31/10000 or (3.1/1000)

Incidence in the first years: 1989-1993= 3.98/1000 livebirths
Incidence in the last five years 1994-1998= 1.91/1000 livebirths
^{2}=702992.5, with Yates' correction, p=0.0000000

Results

General description of the cases

During the ten year period, there were sixteen thousand, six hundred and thirty one (16631) singleton livebirths, out of which fifty (0.31%0 had non-asphyxial birth injuries. This gave an overall incidence of 3.1/1000 livebirths. Of the 16631 livebirths, 8792(52.9%) were delivered in the first five years (1989-1993) and 7839(47.1%) were delivered in the last five years of review. The yearly incidence of non-asphyxial birth injuries decreased over the period of study from 5.5/1000 livebirths in 1990 to 1.3/1000 livebirths in 1998 (Table 1, Fig. 1). Thirty five (70%) injured babies were born in the first five years and 15(30%) in the last five years. The incidences of birth injuries in these two periods were statistically significantly different: 3.98/1000 livebirths compared to 1.91/1000 livebirths (^{2}=702992.5, with Yates' correction, p=0.0000000).

The commonest Mechanical birth injury was cephalhaematoma, 24(48%), followed by Erb's palsy 7(14%). The other types of injuries are shown in Fig. 2. Strangely however, none of the babies had multiple injuries.

Table 2

The Impact of Different Factors on the Incidence of Mechanical Birth Injuries

Factors	Total No of Mothers or Babies	No of Birth Injured Babies	Incidence of Birth Injury/ 1000 livebirths	χ^2 Values (df)	P values
Age of Mother (Years):					
16-20	2760	10	3.62	1.210	0.546
21-25	5067	17	3.36	df=2	
26-30	5917	17	2.87		
31-35	1853	3	1.62		
36-40	1034	3	2.90		
Mother's Parity					
0	4453	26	5.84	15.974	0.000
1-4	8645	21	2.43		
5 and above	3533	3	0.85		
Gestational Ages (Wks)					
Less than 37	1606	4	2.49	0.04**	0.84
37-42	14455	45	3.11		
More than 42	570	1	1.75		
Maternal Booking Status					
Booked	14968	36	2.41	16.11**	0.000
Unbooked	1663	14	8.42		
Mode of Delivery					
Spontaneous Vertex Delivery	12917	30	2.32	32.93, (df= 3)	0.000
Instrumental Vaginal Delivery	153	4	26.14		
Breech Delivery	620	4	6.45		
Caesarean Section	2941	12	4.08		
Birth Weight (g)					
1,500-1999	959	1	1.04	6.999**	0.008
2000-2499	1364	1	0.73		
2500-2999	3603	5	1.39		
3000-3499	4401	23	5.22		
3500-3999	2202	12	5.45		
4000 or More	4102	8	1.95		
Sex of Baby					
Males	8600	37	4.3	9.103**	0.003
Females	8031	13	1.6		
Total	**16631**	**50**	**3.1**		

**Yates corrected

Factors associated with non-asphyxial birth injuries
A number of risk factors for non-asphyxial birth injuries were identified. Their roles are discussed below and presented in Table 2.
Age, Parity and Gestational Ages: The ages of the mothers who delivered at this centre ranged from 15- 38 years with a mean age of 25.2 years. Although women aged 15-20 years had the highest incidence of 3.6/1000 livebirths compared to an incidence of 1.6/1000 among mothers aged 31-35 years, the ages of the mothers did not statistically significantly influence the incidence of non-asphyxial birth injuries (^{2}= 1.21, df= 2, p=0.546074). On the other hand, the parities of the mothers of injured and non-injured differed statistically significantly with the nulliparous women having the highest incidence of 5.8/1000 livebirths compared to an incidence of 0.8/1000 among mothers with 5-6 deliveries (^{2}=15.97415699; with Yates' correction, p=0.000064). Analysis of the gestational ages of the babies showed that pregnancy was term in 45(90%) of the birth-injured babies with a Mechanical birth injury incidence of 3.1/1000 livebirths compared to 2.5/1000 recorded among preterm babies. This difference was not statistically significant (^{2} = 0.04, with Yates' correction, p=0.84).
Maternal Antenatal Booking Status, Modes of Delivery, Birth weights and Sexes of the NonAsphyxial injured babies: Of the 50 injured babies, 36(72%) mothers were booked for antenatal care and 14(28%) were unbooked. These gave an incidence of birth injury of 2.4/1000 among babies of booked mothers compared to an incidence of 8.4/1000 among those of unbooked mothers. The occurrence of birth injury was statistically significantly affected by the antenatal booking status of the mother (^{2}= 16.11, p=0.000060 with Yates' correction). The modes of deliveries for the babies were Spontaneous Vertex, assisted vaginal delivery and Caesarean Sections with Spontaneous Vertex Delivery being the commonest. The incidence of non-asphyxial birth injuries varied from 2.3/1000 livebirths for spontaneous vertex deliveries to 26.1/1000 for babies who had instrumental vaginal deliveries. Thus, the occurrence of birth trauma was statistically significantly affected by the mode of delivery (^{2}=32.93, df= 3, p=0.000000). The birth weights of the babies ranged from 1500 grammes to over 4000 grammes with 40(80%) birth-injured babies being of normal weight (2500-3999 grammes). Two thousand, three hundred and twenty three babies weighed 1500-2499 grammes giving a low birth weight prevalence of 13.97%. The mean birth weight of injured babies was 3440(± 630) grammes. The highest incidence of birth injuries, according to birth weights (5.45/1000), was recorded among babies weighing 35003999 grammes. Babies weighing 2000-2499 grammes had the lowest incidence of birth injuries of 0.73/1000 livebirths. Thus, the incidence of non-asphyxial birth traumas was statistically significantly affected by the birth weights of babies (^{2}=6.999023053, with Yates' Correction, p=0.008151). Similarly, although the sexes of the livebirths were similar with 8600(51.7%) being males and 8031(48.3%) being females, the incidence of non-asphyxial injuries differed statistically significantly among the sexes: 4.3/1000 for males and 1.6/1000 for females (^{2}=9.98, with Yates' correction, p=0.002) (Table 2).

The impacts of the maternal anthropometry, socio-economic profile and duration of the labour on the incidence of birth injuries could not be ascertained because data on these parameters were incomplete.

Discussion
Birth trauma remains a major problem in the tropics. It may be attributable to the high incidence of disproportions (fetopelvic and cephalopelvic), malpresentation, prolonged labour and poor instrumental technique in assisted deliveries. The overall incidence of the non-asphyxial birth injuries or traumas studied over the ten years of 3.1/1000 livebirths may be lower than the true incidence since stillbirths and babies with injuries such as *caput succedaneum*, anoxic trauma, internal injuries and intracranial haemorrhage were excluded. In spite of these setbacks, the incidence of birth injuries of 3.1/1000 livebirths reported in this series is similar to the estimated incidence in the western world of 2-7 /1000 livebirths[1] and the 4.8/1000 livebirths[9] reported from Sagamu in the western Nigeria. This high incidence may be attributable to the fact that this hospital serves as a referral centre for difficult obstetric cases and high-risk pregnancies. However, the gradual decline in the incidence of birth injuries noted in the last five years of the observation period, coincident with the commencement of the Obstetric and Gynaecology Departmental Revolving Fund Scheme, may suggest an improvement in the quality of care in the Department as a probable reason for the gradual but significant decline in the rates. This tends to suggest that with further improvement in the quality of care, the incidence of all types of injuries can be further reduced at this centre. The improvement in the quality of care can however affect the birth injury incidence so long as mothers utilize the available services for antenatal care. This has been shown, in this study, by the lower incidence of birth injuries among babies of booked compared to those of unbooked mothers. This difference in the incidence of birth traumas relating to the booking status of the mothers may be due to a number of factors such as an early detection of mothers with high risk pregnancies

such as those with contracted pelves and cephalopelvic/ fetopelvic disproportions and a deliberate plan on how to deliver them as has been documented by others[10]. It highlights the need to provide accessible and affordable obstetric services to all women in the developing world.

The types of injuries found in the study are similar to those previously published in the literature [2, 11-13]. There are however variations in the relative frequencies of specific injuries reflecting local factors: while haemorrhagic injuries were commoner than fractures and nerve palsies in this study, other workers identified brachial plexus palsies [11, 12], or fractures[12, 13] with a greater frequency. Even within the fracture subgroup, some authors[3, 4, 12] encountered clavicular fractures more often than limb fractures in contrast to the finding in this series and that of Nadas and Reinberg[7].

The risk factors for birth traumas identified in this study have persisted despite previous reports on them and the efforts to control them. They include the ages and parities of the mothers, the gestational ages of the babies, antenatal booking status, mode of delivery and the birth weights of the babies[2, 6, 9]. However, although teenage mothers in this series in contrast to other reports were not at increased risk of having birth-injured babies, they need to be continually and closely monitored in pregnancy and during delivery as they constitute a high risk group for birth injuries[14]. This may be attributable to the higher incidence of disproportion in teenagers as a result of lack of experience and poor pelvic development[14]. Similarly, the nulliparous women, as has also been observed by Adetoro et al, had the highest incidence of birth traumas[9]. Indeed, the proportion of birth-injured babies born by nulliparous women in this study, 52%, is similar to the 60% documented by Adetoro et al in Sagamu[9]. The reasons adduced for this increased incidence among the nulliparous include their inexperience, pelvic contraction and some form of dystocia (soft tissue and bony) [9]. With regards to birth weight as risk factor for birth injury, the relationship between birth trauma and birth weight has not been well established. There have been conflicting reports with some, Nadas and Reinberg, noting that fractures occurred more commonly among preterm low birth weight babies than others[7]. In the present report, although increasing birth weight was associated with increasing incidence of birth traumas, it is important to note that 22% of the fractures in this series occurred in preterm low birth weight babies delivered by assisted breech delivery. Thus, while identifying increasing birth weight as a predisposing factor to birth injuries, one should not forget the smaller, more fragile babies in adverse perinatal circumstances. Extra care is needed in these high risk cases while trying to solve the problem presented by risk factors [11]: the principle of adopting the least traumatic mode of delivery for the preterm, low birth weight infants finds ample support. While efforts to reduce the present incidence of low birth weight deliveries in Nigeria from 16% to less than 10% are strongly recommended in view of the adverse effects of low weight delivery [15-16], commensurate efforts should be put to improve the outcome of deliveries for normal weight babies as a continued poor outcome for this category of babies will make mothers fail to comply with the efforts to improve the birth weight of their babies.

Also to be noted is the parallel increase with birth weight of the incidence of birth trauma and specific injuries such as cephalhaematoma and brachial plexus palsies[4, 5, 9, 11, 12, 17]. The higher incidence of birth injuries documented among normal-weight babies contrasts with the reports from the western world where birth trauma incidence was higher in babies weighing over 4000g than others[1]. The relative increase in birth injuries at a lower birth weights in our environment could be attributed to the high prevalence of pelvic contraction[14] and lack of skilled assistance at deliveries. As has been documented in other studies, males, probably because of higher birth weights, were at increased risk of birth injuries[14]. Similarly, malpresentation, breech delivery and poor instrumental techniques in assisted vaginal delivery have been documented to contribute significantly to a higher incidence of birth injuries[11, 18, 19].

Conclusions

This study has highlighted the persistence of known risk factors to birth traumas in this setting and the need for improved supervision during the antenatal period, labour and delivery. Routine antenatal estimation of the expected birth weight in relation to the pelvic size should be done, as this will help the accoucheur decide the most appropriate mode of delivery on an individual basis. Similarly instrumental vaginal delivery should be carried out with caution vis-à-vis a more liberal recourse to Caesarean section in cases of breech presentation with fetopelvic disproportion. Whichever mode of delivery is adopted, the skill and experience of the attending personnel should be considered. Finally greater effort should be put in through health education to improve utilisation of orthodox maternity services in developing countries such as ours.

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