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Original Article

Incidence and Predisposing Factors of Birth Trauma in a Tertiary Care Hospital in Chennai, India: A Prospective Study

R Senthil Prabhu[1], Mohamed Sajjid[2], Heber Anandan[3]

[1]Senior Assistant Professor, Department of Neonatology, Institute of Obstetrics and Gynecology, Madras Medical College, Chennai, Tamil Nadu, India, [2]Assistant Professor, Department of Neonatology, Institute of Obstetrics and Gynecology, Madras Medical College, Chennai, Tamil Nadu, India, [3]Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Healthcare Limited, Tamil Nadu, India

Abstract

Background: Birth trauma, especially mechanical trauma is one of the important causes of significant neonatal morbidity and rare cause of mortality. With advancement in technology and improved obstetric care and liberal use of cesarean section deliveries, serious birth trauma is decreasing worldwide.

Aim: The aim is to determine the incidence and predisposing factors of birth trauma in a tertiary care hospital.

Materials and Methods: This was a prospective, case-control study carried out at Government RSRM Hospital, Government Stanley Medical College, Chennai between October 2007 and September 2008.

Results: Head and neck injuries were the most common with 253 (88%) injuries, followed by skin and soft tissue injuries 17 (6%), nerve injuries 14 (5%), and bone injuries 4 (1%). No intra abdominal injury has been recorded. In our study, the predisposing factors for mechanical birth trauma were primiparity ($P < 0.0001$), short maternal stature ($P < 0.0001$), unbooked mother ($P = 0.0007$), antenatal obstetrical complications such as malpresentation ($P = 0.001$), cephalo pelvic disproportion ($P < 0.0001$), oligohydramnios ($P = 0.03$), late referrals from peripheral health institutions ($P < 0.0001$), breech presentation ($P = 0.001$), oxytocin use ($P < 0.0001$), obstructed labor ($P < 0.0001$), shoulder dystocia ($P < 0.0001$), instrumental delivery ($P < 0.0001$), size of the baby ($P < 0.0001$), birth weight more than 3.5 kg ($P < 0.0001$).

Conclusion: The incidence of serious birth injuries is very low but minor injuries are significantly high. Primiparity, obstructed labor, instrumental delivery, large baby, malpresentation are the risk factors identified in this study.

Key words: Instrumental delivery, Malpresentation, Mechanical birth trauma, Predisposing factors

INTRODUCTION

Labor is an intensive care situation. The woman and her unborn infant are at potential risk from unpredictable acute emergencies. In the context of increasing level of expectation, knowledge, and medico legal problems, it is the right of every prospective parent to be blessed with normal newborn. However, there are clinical situations inherent to that particular pregnancy when birth injuries are expected. These inherent factors could be maternal, fetal, type of assisted deliveries and finally the experience of the health worker conducting the delivery.

The 19th century was witness to many detailed autopsy clinical studies relating birth trauma to fetal presentation and mode of delivery. Despite a declining incidence due to improvements in obstetrical care and prenatal diagnosis, birth injuries remain a significant cause of morbidity and mortality.

The significance of birth injuries may be assessed by review of mortality data. In 1981, birth injuries ranked 6th among major causes of neonatal death, resulting in 23.8 deaths per 100,000 live births.[1] During ensuing decade because

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Corresponding Author: Dr. R Senthil Prabhu, Department of Neonatology, Sri Rohith Nivas, Plot No. D96/2, 18th Street, Periyar Nagar, Chennai - 600 008, Tamil Nadu, India. Phone: +91-9840853145. E-mail: drsprabhucmc@gmail.com

of refinements in obstetric techniques and the increased use of cesarean deliveries over difficult deliveries dramatic decline occurred in birth injuries as a cause of neonatal death. Statistics for 1993 revealed a reduction to 3.7 deaths per 100,000 live births.[2] The most recent figures available for 2005, the mortality rate in USA were 0.6/100,000 live births.[3]

The overall incidence of birth trauma reported from USA ranges from 6 to 8 injuries per 1000 live births (Perlow *et al.*, 1996).[4] The diagnosis and its notification in Indian setup is nearly impossible as the majority of deliveries are still conducted by unskilled, self-acclaimed birth attendants and even in tertiary medical institutions, autopsies are seldom performed. The Indian literature is deplete with information on birth trauma. Guha *et al.*, 1970, observed the incidence of birth trauma as 6.8/1000 live births.[5]

Injuries to the infant that result from mechanical forces (i.e., compression, traction) during the birth process are categorized as mechanical birth trauma.[6] Factors responsible for mechanical injury may coexist with hypoxic-ischemic insult; one may predispose the infant to the other. Nearly one half are potentially avoidable with recognition and anticipation of obstetric risk factors. Infant outcome is the product of multiple factors.

Many injuries such as soft tissue trauma are minor and self limiting but others such as liver lacerations, subgaleal hemorrhage or large subdural hemorrhage can be life-threatening and require prompt recognition and intervention. Mechanical Birth trauma can result in both physical and neuro developmental handicap.

Aim

To study the incidence of birth trauma and to analyze the factors predisposing to birth trauma.

MATERIALS AND METHODS

Case-control study was conducted in the Department of Neonatology in Government Stanley Medical College. All babies with Mechanical Birth Trauma delivered in RSRM hospital during the study were included in the study. Exclusion criteria: Still births, anoxic birth trauma, and caput succedaneum were excluded from the study. Babies born during the study were examined for mechanical birth trauma. If birth trauma present have been included as cases in this study. Detailed antenatal history and intra partum history, complete physical examination and relevant investigations done for obtaining diagnosis. The first normal baby born during the study period was taken as control and their antenatal and intrapartum history were obtained. Incidence, morbidity pattern and mode of treatment were given in frequencies and their percentage. Maternal weight, parity, weight, height, oxytocin use, duration of labor, shoulder dystocia, mode of delivery, neonatal variables such as sex, maturity, size of the, birth weight, and resuscitation requirements were analyzed using Pearson Chi-square test and Yates corrected Chi-square test.

RESULTS

The study group consists of 12735 babies. Out of them, 283 babies having 288 birth injuries were found as per inclusion criteria. 5 neonates had more than one injury. The incidence of birth trauma was 22.22/1000 live births.

Head and neck injuries were the most common with 253 (88%) injuries, followed by skin and soft tissue injuries 17 (6%), nerve injuries 14 (5%), and bone injuries 4 (1%). No intra abdominal injury has been recorded (Table 1).

Considering the individual injuries subconjunctival hemorrhage recorded in 107 (37%) babies with an incidence of 0.84% of live births. Cephalhematoma was found in 72 (25%) babies, an incidence of 0.57%. In head and neck injuries, abrasions, ecchymoses, laceration found in 31 (10.8%), 23 (7.9%), 8 (2.8%) babies an incidence of 0.24%, 0.18%, and 0.06%, respectively. Soft tissue contusion and laceration recorded in 13 (4.51%), and 4 (1.39%), respectively, an incidence of 0.13% when combined together. Subgaleal Hemorrhage found in 6 (2.08%) neonates an incidence of 0.47/1000 live births. Auricle injury noted in 5 (1.74%), an incidence of 0.4/1000 live births. Sternomastoid tumor was found in 1 (0.35%) baby, an incidence of 0.08/1000 live births. Brachial palsy was found in 10 (3.47%), an incidence of 0.8/1000 live births. Out of this total brachial palsy found in 3 (30%) cases. Facial nerve palsy was found in 4 (1.39%) neonates an incidence of 0.31/1000 live births. In bony injuries Fracture clavicle, femur, and humerus was recorded in 1 (0.35%), 2 (0.7%), and 1 (0.35%) babies, respectively an incidence of 0.08, 0.16, and 0.08, respectively.

An increased rate of primiparity was present which is statistically significant ($P < 0.0001$) (Table 2).

Maternal short stature found in study group was 41 (14%) compared to 4 (1%) in control group which is statistically significant ($P < 0.0001$, odds ratio: 15, confidence interval [CI] [5-51]).

13 (5%) mothers were unbooked in the study group compared to 2 (0.5%) in control group ($P = 0.0007$, odds ratio: 9, CI [2-56]).

Table 1: Incidence of birth trauma based on types

Type of birth trauma	Cases *n*=283 (%)	Incidence percentage *n*=12735 (%)	Incidence per 1000 live births
Head and neck injuries	248 (88)	1.95	19.5
Skin and soft tissue injuries	17 (6)	0.13	1.3
Nerve injuries	14 (5)	0.11	1.1
Bone injuries	4 (1)	0.03	0.3
Intraabdominal injuries	0	0	0
Total		2.22	22.2

Table 2: Distribution of parity in birth trauma

Parity	Cases *n*=283 (%)	Controls *n*=366 (%)	*P*-value
0	218 (77.03)	173 (47.27)	*P*<0.0001
1	55 (19.43)	158 (43.17)	
2	9 (3.18)	31 (8.47)	
>3	1 (0.35)	4 (1.1)	

Most common obstetrical complications found in study group are cephalo pelvic disproportion (CPD)/contracted pelvis 48 (16.96%), malpresentation 22 (7.77%), pregnancy-induced hypertension/pre-eclamptic toxaemia (PIH/PET)/eclampsia 12 (4.24%), gestational diabetes mellitus (GDM) in 8 (2.83%), multiple gestation and oligohydramnios 5 (1.77%) each. In control group PIH/PET/eclampsia 20 (5.46%), CPD 18 (4.92%), malpresentation 9 (2.46%), multiple gestation and GDM 3 (0.82%), nil oligohydramnios were found in decreasing order of frequency. Statistically significant increased rate of malpresentation ($P = 0.001$), CPD/contracted pelvis ($P < 0.0001$), oligohydramnios ($P = 0.03$) were found.

66 (23%) mothers in study group referred late from the peripheral health institutions (PHI) compared to just 6 (1.6%) in control group which is statistically significant ($P < 0.0001$).

Increased incidence of malpresentation found in study group (breech 23 [8.13%] and face 3 [1.06%]) compared to the control group (breech 9 [2.46%] and nil face presentation) which is statistically significant ($P < 0.0001$).The use of oxytocin was 181 (63.96%) in study group, compared to the control group 35 (9.56%) which is statistically significant ($P < 0.0001$, odds ratio: 16, CI [11-26]). The duration of labor was normal in 209 (73.85%), 365 (99.73%) in study and control group, respectively. Obstructed labor was seen in 74 (26.15%) in the study group compared to just 1 (0.27%) in control group, statistically significant ($P < 0.0001$, odds ratio: 124, CI [19-250]). Precipitate labor was not found in both study and control group. Shoulder dystocia was present in 19 (6.71%) deliveries in the study group compared to nil in control group ($P < 0.0001$) (Table 3).

Table 3: Perinatal factors in birth trauma

Perinatal factors	Cases (%)	Controls (%)	*P*-value
Presentation			
Vertex	257 (90.81)	357 (97.54)	0.0002
Breech	23 (8.13)	9 (2.46)	0.001
Face	3 (1.06)	0	0.05
Brow	0	0	n/a
Oxytocin use			
Yes	181 (63.96)	35 (9.56)	<0.0001
No	102 (36.04)	331 (90.44)	
Duration of labor			
Normal	209 (73.85)	365 (99.73)	<0.0001
Obstruted labor	74 (26.15)	1 (0.27)	
Precipitate labor	0	0	
Shoulder dystocia			
Yes	19 (6.71)	0	<0.0001
No	264 (93.64)	366 (100)	

Statistically increased rate of instrumentation was seen in the study group ($P < 0.0001$) (Table 4).

In babies with birth trauma 245 (86.57%) were characterized as appropriate for gestational age (AGA); 23 (8.13%) as large for gestational age (LGA); 15 (5.3%) as small for gestational age (SGA). In the control group, the size of the baby was AGA 308 (84.15%), SGA 57 (15.57%) and LGA 1 (0.28%). LGA babies were significantly increased in the study population ($P < 0.0001$).

The birth injuries were common in babies with a birth weight more than 3.5 kg. Birth weight distribution between groups was significant ($P < 0.0001$) (Table 5).

In our study, the predisposing factors for mechanical birth trauma were primiparity ($P < 0.0001$), short maternal stature ($P < 0.0001$), unbooked mother ($P = 0.0007$), antenatal obstetrical complications such as malpresentation ($P = 0.001$), CPD ($P < 0.0001$), oligohydramnios ($P = 0.03$), late referrals from PHI ($P < 0.0001$), breech presentation ($P < 0.0001$), oxytocin use ($P < 0.0001$), obstructed labor ($P < 0.0001$), shoulder dystocia ($P < 0.0001$), instrumental delivery ($P < 0.0001$), size of the ($P < 0.0001$), birth weight more than 3.5 kg ($P < 0.0001$). The maternal weight, sex of the baby, maturity of the baby does not predispose to birth trauma.

Table 4: Mode of delivery in birth trauma

Mode of delivery	Cases *n*=283 (%)	Controls *n*=366 (%)	*P*-value*
Normal	119 (42.05)	226 (61.75)	<0.0001
LSCS	109 (38.51)	134 (36.61)	
Instrumentation	55 (19.44)	6 (1.64)	

LSCS: Lower segment cesarean section, **P*<0.05 significant

Table 5: Birth weight in birth trauma

Birth weight (kg)	Cases *n*=283 (%)	Controls *n*=366 (%)	*P*-value*
<2.5	28 (9.9)	87 (23.77)	<0.0001
2.5-3.0	55 (19.43)	197 (53.83)	
3.0-3.5	139 (49.12)	76 (20.77)	
3.5-4.0	49 (17.31)	5 (1.37)	
>4	12 (4.24)	1 (0.27)	

**P*<0.05 significant

DISCUSSION

The incidence of birth trauma in this study was 22.22/1000 live births. The higher incidence found in our study is due to the fact that study place is a referral institution, where more number of high risk cases are delivered. Head and neck injuries were the most common with an incidence of 19.47/1000 live births in contrast Hughes *et al.*,[7] 1991-97 reported an incidence of 9.5/1000 live births in his study of Birth trauma in the head and neck. If subconjunctival hemorrhage excluded as done by Hughes *et al.*,[7] incidence of Birth trauma to head and neck was 11.78/1000 live births which is marginally higher. The Nerve injuries had an incidence of 1.1/1000 live births in our study. The incidence of nerve injuries in our study is comparable with study done by Padmini *et al.*,[8] in contrast other studies were marginally higher than the present study (1.61-2.34/1000 live births). The incidence of bone injuries in this study was 0.3/1000 live births. The bony injuries when compared with other studies, higher than the present study. The present study was showing 2-3 times reduction in the incidence of bony injuries than the older studies, may be due to the improved obstetrical care and selecting lower segment cesarean section as mode of delivery for high risk cases. The incidence of Skin and soft tissue injuries in this study is 0.13%. Both lower and higher incidence of soft tissue injuries were found when compared to the present study (0.04-0.32%). No case of intra abdominal injuries were recorded in this study which is comparable with studies done by Padmini *et al.*,[8] in contrast 0.09-0.33/1000 live births, intraabdominal injuries were found in other studies. The incidence of Cephalhematoma in our study was 0.57%. Other studies reported an incidence ranging from 0.12% to 2.5%.The incidence of subgaleal hemorrhage was 0.47/1000 live births in this study. Ng *et al.*,[9] 1990-1993 reported an incidence of 0.8/1000 live births. The reason for low incidence may be due to drastic reduction of vacuum deliveries, just 5 (1.6%) out of 321 instrumental deliveries. The incidence of brachial palsy in this study was 0.8/1000 live births. This was comparable to the study by Perlow *et al.*[4] Other studies incidence ranges from 0.27 to 2.6/1000 live births. The incidence of facial nerve palsy found in our study was 0.31/1000 live births. In contrast to this other studies report higher incidence of facial nerve palsy 0.6-8/1000 live births. Fracture femur incidence in our study was 0.16/1000 live births, which is comparable to the other studies. The incidence of fracture humerus in our study was 0.08/1000 live births, which is comparable to the study done by Al-Habdan[10] 0.1/1000 live births. The incidence of clavicle fracture in our study was 0.08/1000 live births, in contrast to other studies which report higher incidence, 0.46-2/1000 live births.

Predisposing Factors

Primiparity is the most common parity in the study group in our study, which is comparable to other studies even though each group differs. Nearly 95% of the mothers in study group were booked in our study, in contrast to 34.3% in Bhat *et al.*[11] Breech presentation was found in 8.13% of cases in our study, in contrast to Bhat *et al.*,[11] recorded 20% of breech presentation. Obstructed labor seen in 26.15% in our study, in contrast to 17% seen in study done by Hughes *et al.*[7] Normal delivery was the maximum mode of delivery in our study, which is comparable to Awari *et al.*[12] and Padmini *et al.*[8] in contrast Hughes *et al.*,[7] reported instrumentation as the predominant mode of delivery in the study group. The birth injuries were common among babies with birth weight more than 3.5 kg in our study which is comparable to study by Fabamwo *et al.*,[13] in contrast to western reports where birth injuries common in more than 4 kg babies. Even though incidence of birth trauma high in our study, when compared with other studies, there is actually reduction in mortality and major injuries such as nerve, bone, intra abdominal, and intra cranial injuries, just 30 (10.4%) of 288 injuries, all these may be due to the improvement in obstetrical care.

CONCLUSION

Primiparity was the most important risk factor. The presence of maternal obstetric risk factors like Malpresentation increases the incidence of birth trauma even in skilled and competent hands. Early referral from PHI may decrease birth trauma. Use of uterine stimulants, prolonged and obstructed labor, shoulder dystocia predisposes to birth trauma. Instrumental delivery, especially midforceps and vacuum extraction predispose to mechanical injuries. LGA and birth weight more than 3.5 kg are important risk factors. Most of the injuries are self limiting.

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