

A prospective observational study on neonatal birth injuries in a tertiary care teaching hospital in Andhra Pradesh.

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Abstract

Background: Birth injury is defined as the structural damage of a newborn secondary to mechanical forces (compression or traction) during labour, delivery or both. Birth injury can sometimes be avoidable, occasionally inevitable. The incidence of birth trauma varies widely among developing countries. Reported incidence ranges from 0.2 to 41.2 per 1000 live births. The incidence of birth injury has declined with improvements in obstetrical care and prenatal diagnosis.

Methods: This study is a prospective observational cohort study, conducted at Narayana Medical College and hospital, Nellore. The study was conducted during the period from December 2018 to March 2021.

Results: Birth Injuries recorded among boys and girls was 41.67%, 58.33% respectively. Male to female ratio was 0.8: 1.16. Majority 19 (79.16%) of the birth injuries were observed among babies with vertex presentation, followed by breech 3 (12.5%), brow 1 (4.17%) and transverse (shoulder) 1 (4.17%) presentation. Birth injuries were common in neonates born to mothers of age between 21–30 yrs.

Conclusions: Incidence of birth injury observed in our study was 1.926% (24 per 1246 total babies). Birth injuries were more common in babies with birth weight more than 3 kg. A majority of the babies with birth injuries were term born, 2 were preterm. A total of 24 birth injury cases were observed. Two major risk factors for birth injuries were normal delivery and birth weight more than 3 kg.

Keywords: Birth injuries, Neonatal period, Fractures, Nerve injuries.

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Introduction

A birth injury is defined as the structural damage of a newborn secondary to mechanical forces (compression or traction) during labour, delivery or both [1,2]. Birth injury can sometimes be avoidable, occasionally inevitable [3]. The incidence of birth trauma varies widely among developing countries [4]. Reported incidence ranges from 0.2 to 41.2 per 1000 live births. The incidence of birth injury has declined with improvements in obstetrical care and prenatal diagnosis. The risk factors are classified into three categories: Fetal factors, maternal factors and the delivery mechanism. Fetal factors are macrosomia, abnormal fetal presentation and prematurity. Maternal factors are age, parity and pelvic anatomy. Delivery mechanisms include obstetric instrumental techniques like forceps and vacuum-assisted delivery [5]. Study of birth trauma from the Indian perspective is scarce. Hence, the present study was planned to document the incidence and risk factors for birth trauma with the goal of generating inputs towards reducing neonatal mortality and morbidity.

Materials and Methods

Design of the study

This study is a prospective observational cohort study conducted at Narayana Medical College and hospital, Nellore

Study period

The study was conducted during the period from December 2018 to March 2021.

Study setting

The study was conducted in the department of paediatrics, Narayana Medical College Hospital, Nellore.

Study population

Newborn babies born at Narayana Medical College Hospital, Nellore were observed for this study.

Sample size

Out of 1246 newborn babies, 24 were observed to have birth injuries.

Inclusion criteria

Neonates born in Narayana medical college hospital were observed in the study. A total of 1246 babies were observed during the study period. Among these 24 babies were found to have birth injuries which formed the study group.

Exclusion criteria

- Neonates whose parents have not given consent
- Still born/intrauterine deaths/terminated pregnancies
- Neonates with congenital malformations
- Babies delivered at a hospital other than Narayana Medical College Hospital.

In this study, all live-born neonates born in Narayana medical college hospital were assessed. Variables like maternal age, gestational age, birth order, type of presentation, mode of delivery, sex/weight of the baby, duration of labour and any instrumental delivery were noted. Wherever necessary, investigations like x-rays and ultrasound was done. The baseline characteristics of the mother and the risk factors causing birth trauma were recorded in the performa.

Statistical analysis

After assessment of birth injuries, values are tabulated. Descriptive, inferential statistics were used for the analysis of birth injuries. Descriptive data are presented as number and percentages. Chi-square test was used to assess the association between birth injuries with various factors. SPSS software

Version 24.0 was used for the analysis of the results. A p-value of 0.05 or less was considered for statistical significance.

Results**Gender distribution and birth injuries**

Injuries among boys and girls seen were 41.67%, 58.33% respectively. Male to female ratio was 0.8: 1.16. Birth injuries in 10 males and 14 female babies were recorded. The attributable risk is 1.71, risk ratio is 1.16, odds ratio 0.58.

Type of presentation and birth injuries

Majority 19 (79.16%) of the birth injuries observed were among babies with vertex presentation, followed by breech 3 (12.5%), brow 1 (4.16%) and transverse (shoulder) 1 (4.16%) presentation. But observing the total study population, birth injuries are more common in abnormal presentations.

Comparison of birth injuries in relation to normal presentation versus abnormal presentation

It shows that the incidence of birth injuries were more among cases with abnormal presentation (9.61%) in a total of 52, while that with vertex presentation was only 1.6% in a total of 1194 deliveries (Table 1).

Majority cases show soft tissue injuries as noted in 8 cases (33.33%), haemorrhages in 4 cases (16.67%), fractures in 3 (12.5%), laceration in 3, nerve injuries in 2 (8.33%), hemorrhages+soft-tissue injuries in 2 (8.33%), soft-tissue injuries+nerve injuries in 1 (4.167%), laceration and contusion in 1 (4.167%), ecchymosis and bruising in 1 (4.167%) cases respectively (Table 2).

S.no	Type of birth injury	Number of cases	%
1	Soft tissue injury	8	33.33
2	Nerve injuries	2	8.33
3	Soft tissue injuries+nerve injuries	1	4.16
4	Haemorrhages	4	16.67
5	Hemorrhages+soft-tissue injuries	2	8.33
6	Fracture dislocations and epiphyseal separations	3	12.5
7	Laceration	3	12.49
8	Laceration and contusion	1	4.16
9	Ecchymosis and bruising	1	4.16
	Total	24	100

Table 1. Spectrum of birth injuries.

S. No	Gestational age	No of cases observed	Birth injuries observed	Percentage
1	Preterm	99	2(8.34%)	7.95%
2	Term	1147	22(91.66%)	92.05%
	N	1246	24	100%

Table 2. Gestational age and birth injuries.

Data presented in Table 2 shows that majority (92.05%) of the babies were term born and among them 24 birth injury cases were found, of which 2 were preterm babies (Table 3).

Table 3 shows that the number of birth injuries were common in neonates born to mothers of age between 21-30 yrs; under statistical chi-square analysis P-value (0.00001) significant. The number of birth injury cases observed in neonates were 5, 8, 7 and 4 with maternal age

group of <20 yrs, 21-25 yrs, 26-30 yrs and 31-36 yrs respectively (Table 4 and Table 5).

Chi square value is 9.5 and P-value is <0.001. The above Table 5 shows that attributable risk is 1.42, odds ratio is 1.6. Table 4 and 5 shows that vaginal delivery when compared to C-section is a clear risk factor with majority of birth injuries seen in normal vaginal delivery. Birth injuries are much more common in vaginal delivery with assisted forceps (Table 6).

Maternal age in Years	With injuries	Without injuries
<20	5	410
21-25	8	320
26-30	7	332
31-36	4	160
Total	24	1222

Table 3. Maternal age and birth injuries.

Delivery	With injuries	Without injuries	Total
Forceps	4	52	56 (4.49%)
Normal delivery	14	856	870 (69.83%)
C-section	6	314	320 (25.68%)

Table 4. Birth injuries in relation to mode of delivery.

Risk factor	With injuries	Without injuries	Total
Yes	14	856	870 (69.82%)
(Vaginal delivery)			
No	6	314	320 (25.68%)
(C-section)			
Total	20	1170	

Table 5. Birth injuries in C-section vs. vaginal delivery.

Birth wt	With injury	Without injury	Total	% of birth injuries
1-2 kg	1	156	157	0.64%
2.1 to 3 kg	11	750	761	1.44%
>3 kg	12	340	352	3.40%

Table 6. Weight of the baby and birth injuries.

Chi square value is 14.5; P-value<0.001. The above table shows that birth injuries are more common in babies with birth weight more than 3 kg. In chi-square statistical analysis it is showing that P-value<0.001. Therefore birth weight >3 kg is significant risk factor for birth injury (Figures 1 and 2).



Figure 1. Erb's palsy right hand.



Figure 2. Fracture humerus left hand.

Discussion

The term birth injury denotes an avoidable or unavoidable mechanical injury during the process of delivery. Even though there has been declining incidence in the recent years due to improvement in the quality of obstetrical care, it still remains a major cause of morbidity and mortality and one of the most important preventable causes of neonatal morbidity. Incidence of birth injuries varies widely, while the morbidity and mortality from birth injury have fallen to as low as 2% of neonatal mortality and 3% of neonatal morbidity, which reflects the advancement in obstetric care.

Incidence of birth injuries

During our study period, we observed 1246 deliveries. Out of them, 24 babies had various birth injuries. The incidence rate was 1.926% in our study. A study by Warke et al., revealed the incidence of birth injuries to be 3.26 per 1000 live births [6].

Similarly, in a study conducted by Suleiman et al., the incidence of birth injuries was found to be 0.4% [7].

Sex distribution

In our study group out of 1246 deliveries, 41.67% of babies were male and 58.33% were female among whom 10 male babies and 14 female babies had birth injuries. This result was comparable to the study conducted by Numan et al., in which 57 males and 43 females were found to be having birth injuries [8]. In our study, it showed that birth injuries occurred more in female babies. Birth injuries were 1.4 times more common in female babies when compared to their male counterparts; though not statistically significant. Whereas other studies by Osinaike et al., revealed 62.7% of birth injury cases to be males, higher than females [9].

Gestation

Out of 1147 term babies, 22 babies had birth injuries (91.67%) and out of 99 preterm babies, only two babies had birth injuries (8.33% of total birth injuries). Our study shows that birth injuries are more common in term babies. A study by Rao et al., reported that the incidence of birth trauma is high in preterm babies (27%) compared to term babies (1.3%) in the total study population. 17 babies (94.4%) were preterm births with Gestational age <37 weeks. one baby (5.6%) was term.

Spectrum of birth injuries

The most common birth injuries observed in our study was soft tissue injuries, seen in 8 (33.33%) of total birth injuries; cephalhematoma was seen in 3, haemorrhages were seen in 4 cases (16.67%), Fracture/dislocations and Epiphysical separations in 3 cases (12.5%), nerve injuries in 2 cases, laceration in 3 cases and others having a combination of injuries. A similar study by Sauber-Schatz et al., showed the rate of birth trauma was 29 per 1000 in hospital births. Injuries to the scalp were the primary type of birth trauma (20.6 per 1000 births followed by other injuries to the skeleton (3.70 per 1000 births) and fracture of the clavicle (2.43 per 1000 births).

Maternal age

The age of the mother may contribute to the incidence of birth injury. If the mother is very young or if she is elderly primi, and if the birth canal is rigid, the head has to be molded under pressure and body has to be squeezed through the rigid birth canal resulting in birth injuries. There may be shoulder dystocia which results in fractures and/or peripheral nerve injuries.

In our study 5,8,7 and 4 birth injury cases were observed in neonates whose mothers age group was <20 years, 21-25 years, 26-30 years and 31-36 years respectively. It shows that birth injuries more common in young primi age group of mothers. If the mother is young, the birth canal will be rigid hence the occurrence of birth injuries can be expected more. Osinaike et al., study showed 17-30 groups had birth injury incidence in 77.3%.

Parity

Our study showed 10 babies with birth injuries were second-born (parity 2), 9 babies were first born (parity 1), 3 babies were third born (parity 3) and 2 babies were fourth born (parity 4). The incidence of injuries diminished as the birth order increased. In primi mothers, the in elastic birth passage exerts more pressure so that the baby has to pass through the birth canal under stress which may lead to birth injuries. In grand multiparas, the resilient birth canal may make the fetus lie in an abnormal position which leads to birth injuries. Similar results were also observed in a study by Bhalla et al., (66.6%).

Presentation

Majority of the injuries were noted in the babies born by vertex presentation. Out of 1246 deliveries, 19 (79.16%) were vertex presentations, followed by breech 3 (12.5%), brow 1 (4.17%) and transverse (shoulder) in 1 (4.17%) presentation. It shows that birth injuries are more common in abnormal presentations. The possible reason for more injuries seen with abnormal presentations is due to instrumentation like forceps that lead to soft tissue injuries. In this study, 3 cases (12.5%) of the babies were breech, brow in 1 (4.17%) and transverse (shoulder) in 1 (4.17%) presentation. Sulaiman et al., reported that of the injured, the presentation was cephalic in 24 (88.9%) cases and breech in 3 (11.1%).

Mode of delivery

Many a time nature of birth injuries are determined by the mode of delivery, soft tissue injuries could occur in babies who are delivered by vaginal delivery, but if there is prolonged labour, there are chances of developing asphyxia. In our study out of 24 birth injuries, 14 were delivered through normal vaginal delivery, 4 deliveries with forceps and 6 through LSCS. The application of forceps, the skill of the obstetrician, duration of labour and size of the head, determines the nature and incidence of birth injuries.

Weight of the baby

It must be remembered that babies that are large are particularly prone to suffer from birth injuries during labour. In our study, the incidence of birth injuries was 3.39%, 1.47%, 0.637% among birth weight of >3.1 kg, 2.1-3 kg and 1-2 kg respectively. It is shown that injuries were more common in babies with birth weight more than 3.1 kg. Hence, birth weight >3.1 kg is a risk factor for birth injury.

Conclusion

Incidence of birth injury observed in our study was 1.926% (24 per 1246 total babies). Birth injuries were more common in babies with birth weight more than 3 kg with majority observed in term neonates. More cases of birth injuries were noted in babies born by vaginal delivery in comparison to C-section. Among those born through vaginal delivery, forceps assisted deliveries caused more birth injuries.

Regular follow up during the antenatal period, early identification of risk factors for a difficult delivery and avoidance of traumatising manoeuvres, instrumental deliveries and early intervention in the form of LSCS when indicated are key factors in reducing traumatic birth injuries. Finally, factors like application of forceps, the skill of the obstetrician, duration of labour and size of the baby's head determine the nature and incidence of birth injuries.

Ethical approval

The study was approved by the institutional ethics committee.

Limitations of the study

In our study, we included deliveries that occurred only in our hospital.

All stillborn babies were excluded; the predisposing factor for stillborn could have been a birth injury.

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