

# Prospective study of birth injuries in neonates delivered at a tertiary care centre: Analysis of cases from September 2016 to December 2018

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## Abstract

**Background:** Mechanical traumas are one of the preventable birth injuries during the process of labor and delivery. There are limited data from India on the incidence and pattern of mechanical trauma during labor and delivery.

**Objective:** To find out incidence and outcome of birth injuries in a tertiary care hospital. **Material and methods:** In this prospective observational study, all new-born babies delivered in our hospital from September 2016 to December 2018 (28 months) were screened immediately after birth to check for any birth trauma. Follow up of babies with birth trauma was done for 6 months to evaluate the outcome. **Results:** Out of 6100 deliveries conducted during study period of which 14 had birth injuries with incidence of 2.29/1000 live births. The mean (SD) age and gestational age of mothers was 27.14 (4.40) years and 37.5 (1.64) weeks respectively. Nine (64.29%) deliveries were conducted through LSCS whereas 3 (21.43%) deliveries were conducted with vaginal route and in 2 (14.29%) cases forceps were applied for the delivery of babies. Birth weight of 14 new-born who sustained birth injuries was 2.93 (0.56) kg. Three (21.42%) new-borns out of 14 had breech presentation whereas one had transverse presentation. Most of the injuries were managed without significant morbidity. Only one new-born baby died. **Conclusion:** Mechanical trauma is not common during the process of labor and delivery. Most of the mechanical traumas are minor and short-term outcomes are satisfactory.

**Key Word:** Birth trauma, new-born, delivery

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Received Date: 26/07/2019 Revised Date: 15/08/2019 Accepted Date: 22/09/2019

DOI: <https://doi.org/10.26611/10121211>

## Access this article online

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Accessed Date:  
02 October 2019

## INTRODUCTION

Birth trauma is an injury to the newborn sustained during the process of birth. Major birth trauma is one of the

important concerns for obstetricians involved in conducting delivery because of its contribution to neonatal morbidity and mortality.<sup>1-4</sup> These concerns are because of risk of impairment of body functions based on the severity. According to the estimates, overall incidence of birth trauma is 2-7 per 1000 live births.<sup>4</sup> In the United States, the estimated rate of mechanical birth-related injuries is 2.6%.<sup>5</sup> The rates of birth trauma may vary in different countries<sup>3-6</sup> and also institutions within the country. A study from India reported incidence of 15.4 per 1000 cases of live births.<sup>7</sup> Pattern of birth injuries may vary from minor superficial injuries to the skin to serious and life threatening problems.<sup>3</sup> With advances in diagnostic facilities and perinatal care, there has been reduction in the incidence of mechanical injuries during

**How to cite this article:** Richa Singh, Hemant Lahoti, Aaradhana Bhamre, Shital Kolhe, Sriram Gopal. Prospective study of birth injuries in neonates delivered at a tertiary care centre: Analysis of cases from September 2016 to December 2018. *MedPulse – International Journal of Gynaecology*. October 2019; 12(1): 01-05. <http://medpulse.in/Gynaecology/index.php>

birth process.<sup>4,8</sup> Still, it is important to identify the risk factors and causes of birth injury to avoid risk of morbidity and mortality. At the same time, it must also be remembered that the rates of birth injury are unpredictable. With proper care, most of the birth injuries are avoidable, but some are inevitable. The rates of birth injuries have reduced over the period of time with improvements in obstetric and perinatal care.<sup>6</sup> There is limited literature about pattern, incidence and outcomes of birth trauma in Indian settings. Such studies are important because availability of data may help to understand the pattern of injuries and risk factors. Moreover, attending paediatricians in cases of risk factors may help to identify and treat such injuries early and avoid future complications.<sup>9</sup>

## OBJECTIVE

The objective of present study was to find out incidence of birth trauma and short term outcomes of new-borns with birth trauma.

## RESULTS

During 28 months of study period, a total of 6100 deliveries were conducted. Table 1 gives distribution of deliveries conducted by different types i.e. vaginal, lower segment caesarean section (LSCS), forceps delivery and vacuum delivery.

**Table 1: Deliveries from September 2016 to December 2018**

	2016 (n=1264)	2017 (n=2619)	2018 (n=2217)
Vaginal delivery	610 (48.26%)	1269 (48.45%)	1155 (52.10%)
Lower segment Caesarian section (LSCS)	635 (50.24%)	1314 (50.17%)	1024 (46.19%)
Forceps delivery	12 (0.95%)	26 (0.99%)	22 (0.99%)
Vacuum delivery	7 (0.55%)	10 (0.38%)	16 (0.72%)

A total of 6100 deliveries were conducted during study period of which 1264 (20.72%), 2619 (42.93%) and 2217 (36.34%) were occurred during 2016, 2017 and 2018 respectively. Of the total 6100 deliveries number of vaginal deliveries during 2016, 2017 and 2018 were 10%, 20.80% and 18.93% respectively. The percentages of LSCS during these periods were 10.41%, 21.54% and 16.79% respectively. In 2016, number of vaginal deliveries and LSCS were 610 (48.26%) and 635 (50.24%) respectively. The corresponding numbers and percentages in 2017 and 2018 were 1269 (48.45%) and 1314 (50.17%) and 1155 (52.10%) and 1024 (46.19%) respectively [Table 1]. During the entire study period, the incidence of deliveries with breech presentation and twin deliveries were 131 (2.15%) and 105 (1.27%). Intrauterine fetal deaths were observed in 40 (0.66%) cases. A total of 5320 (87.21%) deliveries were full term and 986 (16.16%) cases required admission in neonatal care unit (NICU). Congenital anomalies were found in 45 (0.74%) cases. A total of 14 birth injuries among 6100 live births were recorded, giving an incidence of 2.29/1000 live births. The mean (SD) age and gestational age of mothers was 27.14 (4.40) years and 37.5 (1.64) weeks respectively. Out of 14 mothers, 10 (71.42%) were primigravida whereas two were gravida II and gravida-III respectively and two (14.29%) were patients with diabetes mellitus. Nine (64.29%) deliveries were conducted through LSCS whereas 3 (21.43%) deliveries were conducted with vaginal route and in 2 (14.29%) cases forceps were applied for the delivery of new-borns. Birth weight of 14 new-born who sustained birth injuries was 2.93 (0.56) kg. The details of the birth injuries are summarized in table 2. Three (21.42%) new-borns out of 14 had breech presentation whereas one had transverse presentation. Other 10 (71.43%) had cephalic presentation of whom one had deflexed head.

**Pattern of birth trauma:** One new-born delivered to a primigravida had green stick fracture of femur which healed during follow up. Another new-born of a mother with severe oligohydromnios had contusion on left armpit which was resolved during follow up. A new-born of a gravida-II mother had deep transverse arrest and developed right ankle swelling due to contusion which healed during the period of follow up. Scalp-injury in another new-born was non-

## MATERIAL AND METHODS

In this prospective study, all babies born at a tertiary care centre were screened for any birth injury. All the live births occurring with normal vaginal delivery or instrumental delivery or lower section caesarean section during September 2016 to December 2018 were included in the study. Immediately after delivery, new-born babies were examined clinically by an obstetrician in the delivery room. All the new-borns with birth trauma were investigated to confirm the diagnosis, and appropriate management was offered in the hospital. Only soft tissue or skeletal injuries were included for analysis. These new-borns were followed-up until 6 months of age and outcomes of the injuries were noted.

**Statistical analysis:** Collected data are presented as routine descriptive statistics. Continuous data are presented as mean and standard deviation whereas categorical data are presented as number and percentages.

significant. One new-born had deep scalp laceration which was sutured immediately. Two more cases had superficial scalp injury. A new-born with 4.2 kg body weight in gravida-II mother with diabetes developed shoulder dystocia who was delivered with Rubin's maneuver who developed Erb's paralysis of left arm for which physiotherapy was initiated. After three weeks of physiotherapy treatment, there was significant improvement and recovery of functions. In another diabetic mother, new-born of 3.8 kg birth weight delivered through vaginal route developed Erb's paralysis of right hand. This baby had poor APGAR score and required ventilation. Currently, the baby is on physiotherapy for right arm. One new-born developed iatrogenic superficial burn to right forearm and abdomen due to prewarming of the drape sheet. This injury missed on the first day was detected during examination on second day. A new-born of gravida-III mother delivered through LSCS had hip dislocation which was treated by pediatric orthopaedician by applying cast. One new-born had deep laceration on the right eyebrow which was sutured and other had non-significant contusion on left ear lobe. One infant was delivered as still birth because of the arrest after coming head in breech delivery.

**Table 2: Birth injuries in new-borns born from September 2016 to December 2018**

	Age	Parity	Gestational age	Presentation	Birth weight	Mode of delivery	Indication	Surgeon	Birth injury
1	32	Primi	37	B	3.2	LSCS	Breech	R	Fracture femur green stick
2	26	Primi	40	B	2.8	V	Breech	L	Arrested after coming head OF breech Fresh still birth
3	25	Primi	33.4	C	2.1	LSCS	Severe oligydromnios	R	Contusion on left armpit
4	25	G2	36.3	C	2.9	LSCS	Deep tranverse arrest	L	Right ankle swelling (contusion)
5	22	Primi	37	C	2.1	LSCS	Fetal distress	L	Scalp-injury (non-significant)
6	28	Primi	38.2	C	2.7	LSCS	Failure of induction for PIH	AP	Deep scalp laceration (sutured immediately)
7	24	Primi	38	B	3	LSCS	Breech	AP	Superficial scalpel injury
8	37	Primi	38.3	C	2.7	LSCS	Severe fetal distress	R	Scalpel injury on scalp
9	32	G2 with diabetes	39.4	C	4.2	V	Presented in advance labour	AP	Shoulder dystocia delivered by McRobert's and Rubin's maneuver Erb's palsy of left arm
10	24	Primi	36	C	2.9	LSCS	Fetal distress	R	Iatrogenic superficial burn injury to right forearm and abdomen
11	25	G3	38	T	2.9	LSCS	PEV 2 LSCS with fibroid	L	Hip dislocation
12	32	Primi with diabetes	37.4	C	3.8	V	-	R	Erb's palsy of right hand with poor APGAR; required ventilation.
13	23	G3 PRV 2 FTND	39	C Deflexed head	2.6	F	Prolonged second stage	L	Deep laceration on right eyebrow
14	25	Primi	37	C	3.1	F	Outlet CPD	R	Contusion n left ear lobe

B: Breech, C: Cephalic; CPD-cephalopelvic disproportion, F: Forceps, L: Lecturer; NA-not available; R: Registrar, V: Vaginal We observed one case of Aplasia Cutis Congenita Type VI-Bart Syndrome, mimicking birth injury (Figure 1).



Figure 1: Aplasia Cutis Congenita Type VI-Bart Syndrome

## DISCUSSION

Birth injuries are one of the concerns during labor and delivery process especially during vaginal delivery.<sup>10</sup>The risk factors for birth injuries could be related to mother, neonate or method of delivery.<sup>11</sup>In many cases, birth injuries cannot be predicted. There is strong correlation between birth injuries and fetal macrosomia and short stature of mother.<sup>10</sup>Other factors associated with birth injury include primiparity and vacuum/ forceps delivery.<sup>12</sup> The injuries can range from minor lacerations to severe trauma or neurological/cranio-cerebral injuries.<sup>13-15</sup> In our study, minor injuries were common which included contusions and minor scalpel injuries which did not require major interventions. Two cases had deep lacerations; one on the scalp and other on right eyebrow. These lacerations were sutured immediately, and the outcomes were uneventful. Two cases required orthopaedic interventions. One new-born had fracture femur green stick and other with hip dislocation. Injury to brachial plexus is common during birth process.<sup>15</sup>Macrosomia and shoulder dystocia are important neonatal causes of brachial plexus injury<sup>16</sup>and Erb's palsy.<sup>17</sup>Erb's palsy occurs due to injury to nerve roots C5 and C6 and sometimes C7 resulting in weakness of muscles supplied by these nerves.<sup>17</sup> Majority of new-borns with brachial plexus injury recover without any specific intervention, however, in some it may result cases with severe injury in life long disability.<sup>18</sup> In our study, two new-borns developed Erb's palsy. Birth weight of both the infants was more than average birth weight of infants with other injuries (Table 2). Secondly, both the deliveries had occurred with vaginal route. Based on this, vaginal delivery in a high birth weight child may be considered as a risk factor for Erb's palsy. However, it should be noted that Erb's palsy can also occur with LSCS.<sup>17</sup>Similarly, experience of healthcare professional conducting delivery may not affect its risk.<sup>17</sup>In our study, all deliveries were conducted by experienced physicians. It is known that birth injuries can occur in normal spontaneous labor in the absence of risk factor.<sup>2</sup>Mother of

a new-born with 4.2 kg birth weight presented in advanced stage of labour and she was not registered for antenatal care at our centre. One new-born with Erb's palsy needed ventilation because of poor health status. Almost all new-borns recover during initial few months.<sup>17</sup>A study reported that about 80% children with brachial plexus injury completely recovered by 13 months of age.<sup>19</sup>Both new-born were with Erb's palsy were treated with physiotherapy. One showed significant improvement with three weeks of physiotherapy and in another new-born physiotherapy was on-going at the time of writing this paper. Overall, our experience suggests that vacuum deliveries are safer than deliveries by forceps application. Shoulder dystocia is another important concern during delivery of new-born and there have been reports of its increasing rates.<sup>20</sup>A study<sup>16</sup> reported shoulder dystocia in 50% (8/16) children with brachial plexus injury and macrosomia in 37.5% (6/16). In our study, there was only one case of shoulder dystocia. In case face presentation, facial injuries are possible.<sup>21</sup>In our cohort, there was no case of facial injury. Most cases had involvement of scalp or limbs. We also observed a case of Aplasia Cutis Congenita Type VI i.e. Bart syndrome. In this condition, the infant has congenital localized absence of skin, mucocutaneous blistering and abnormalities of the nail.<sup>22,23</sup>In utero physical trauma is the postulated mechanism for skin abnormality on limb.<sup>22</sup>It is important to differentiate such cases from those with birth injuries. Because of the small number of birth injuries, we did not perform statistical analysis with any test of significance. This is the limitation of our study.

## CONCLUSION

There are limited data on birth trauma from India. The study provides several insights into the epidemiological pattern of birth injuries. Overall, it can be concluded that obstetrician's cannot totally eliminate the appearance of birth injuries, but can significantly help to reduce the incidence and serious complications arising out of birth injuries. Larger, multi-centre studies are required for

developing strategies for prevention of birth injuries and improvement of maternal and infant health. Departmental level protocols should be developed for handling difficult labours. An experienced neonatologist should be available for quick diagnosis, and team approach should be adapted in management of injured new-born.

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Source of Support: None Declared  
Conflict of Interest: None Declared