



## Research Article

# Birth Trauma in Newborns: Frequency, Associated Factors and Outcome at CHU Gabriel Touré Pediatric Department

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## Abstract

**Introduction:** Birth trauma in newborns is the result of difficult deliveries. Despite improvements in pregnancy monitoring and the standardization of delivery care, injuries in neonates during delivery remain a major concern in neonatology. **Methodology:** Study conducted from January 1, 2014 to December 31, 2018, was a retrospective, cross-sectional, analytical study. The purpose was to determine the frequency of obstetric trauma in newborns at CHU Gabriel TOURE, to analyze the different types of injuries observed and to assess risk factors. All newborns admitted to neonatology for injuries were included. **Results:** Thirty-nine neonates were included (n=39). The sex ratio was 1.29 (M= 22; F=17). Hospital frequency was 1.9 ‰. The majority of patients were admitted within the first 24h (n=35; 90%). The majority of mothers were aged between 20 and 34, (i.e. 76.8 %). Multiparous women represented 38% of the mothers. No pregnancy follow-up had been carried out in 23.1% of mothers. Deliveries by vaginal route accounted for 82.1%. Caesarean section accounted for 18%. Transverse fetal presentation was the most frequent reason for Caesarean section, representing 57%. Instrumental delivery was performed in 23.1% of deliveries. Cupping was utilized in 18%. Perinatal anoxia accounted for 59% of newborns. Trauma in newborns was as follows: Serosanguineous bump (n= 6; 15%), Skull skin injury (n=5; 13%), Brachial plexus nerve palsy (n=13; 33%), Femur fracture (n=12; 31%). Trauma to the skull and face accounted for 25.6%. Twelve patients (31%) received treatment with a posterior splint. Twenty percent of neonates had polytraumatism. Instrumental birth was a significant factor in neonatal craniofacial trauma (p = 0.0001). Macrosomia was a risk factor for brachial plexus palsy (p= 0.03). Breech positioning was a factor in the occurrence of lower leg fractures (p=0.001). The mortality rate was 33.3% (n=13). Perinatal asphyxia was the main cause of death (n= 23; 59%). **Conclusion:** Newborn birth trauma remains a major concern in neonatology in our country. Enhanced monitoring of pregnancy and delivery will reduce the morbidity and mortality associated with this disorder.

**Keywords:** Newborn trauma; Delivery; Mali

## Introduction

Neonatal trauma during birth is the combination of local and general disorders caused by a lesion produced on a limited segment of the organism, arising from a violent action external to this organ, either during normal or pathological parturition [1,2]. The most frequently encountered are brachial plexus palsy, cephalohaematoma, serosanguineous hump and clavicle fracture [3,4]. In the West medical literature, trauma of the newborn affects 20-30 babies per 1000 live births [5, 6]. In Africa, statistics are not available, but studies from Mali and Morocco reveal a frequency of 0.68% and 0.26% respectively [7-9]. The main risk factors are fetal macrosomia, instrumental delivery, fetal breech presentation, parity and maternal age [10-14]. Severity varies according to the type of trauma encountered, with some cases, such as head trauma, immediately life threatening. Others, such as brachial plexus paralysis and bone fractures, can result in serious sequelae that threaten functional prognosis. Trauma during birth should be suspected in any newborn who has had a dystocic delivery. However, even in the case of eutocic delivery, there is a risk of birth injuries to the newborn [15]. Worldwide, there is a decrease in the incidence of neonatal trauma during delivery due to improvements in the obstetrical care and prenatal diagnosis. However, they remain an important cause of neonatal morbidity and mortality [16-18]. The aim of this study is to determine the prevalence of trauma in newborns at CHU Gabriel TOURE, to analyze the different types of injury observed and to assess risk factors.

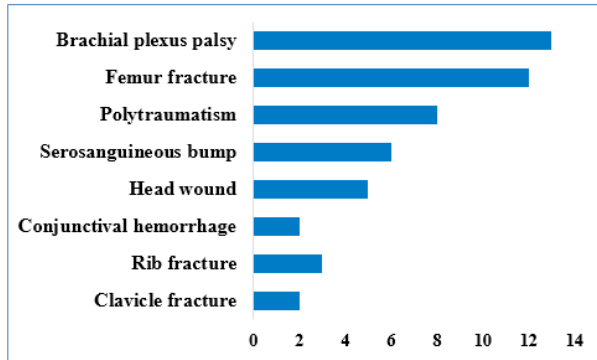
## Methodology

The research was a retrospective cross-sectional analytical study conducted from January 1, 2014 to December 31, 2018 (5 years). The purpose was to determine the prevalence of trauma in newborns at CHU Gabriel TOURE to analyze the different types of injuries observed and assess risk factors. Were included newborns aged 0-28 days admitted to neonatology for trauma during delivery. Data were collected from patients' clinical records. Each file was analyzed with reference to a survey sheet that included epidemiological, obstetrical, clinical, paraclinical, therapeutic and outcome data during hospitalization. The parameters collected were treated with SPSS 25.0 software (SPSS Inc., Chicago, IL). The quantitative variables were calculated as mean with standard

deviation, while the qualitative variables were summarized as numbers and percentages. We proceeded with a descriptive analysis of epidemiological characteristics, maternal history, pregnancy and delivery progress, as well as clinical and paraclinical data and therapeutic procedures performed. Chi<sup>2</sup> and FISHER's exact test were used to compare our proportions, with a p-value significant if less than 0.05 (P<0.05).

## Results

Thirty-nine neonates were included (n=39). The sex ratio was 1.29 (M= 22; F=17). The hospital frequency was 1.9 %. The majority of patients were admitted within the first 24h (n=35; 90%). Newborns referred accounted for 92%. District secondary hospitals referred 67% of patients (n=24). The majority of mothers (76.8%) were aged between 20 and 34. The housewives represented 66.7% of the mothers. Multiparous women accounted for 38% of mothers. Pregnancy follow-up had not been conducted for 23.1% of mothers, and the majority (48.7%) had attended more than 4 prenatal consultations. Pregnancies were monitored in 76.9% of cases, of which 84.6% were achieved at full term. In 97% of cases, deliveries were performed in a hospital facility. Deliveries by vaginal route accounted for 82.1%. Caesarean section accounted for 18%. Fetal cross presentation was the most frequent reason for Caesarean section, accounting for 57%. Ten percent of newborns were macrosomic. Cephalic and breech presentation accounted for 49% and 36% respectively. Instrumental extraction was used in 23.1% of deliveries. Cupping was used in 18% of extractions. Perinatal anoxia accounted for 59% of newborns. The majority of newborns were eutrophic (82%). Trauma in neonates was as follows (Figure1) Serosanguineous hump (n= 6; 15%), Scalp skin injury (n=5; 13%), Brachial plexus palsy (n=13; 33%), Femur fracture (n=12; 31%). Trauma to the skull and face accounted for 25.6%. Twelve patients (31%) received a posterior splint. Twenty percent of neonates had polytrauma. Orthopedic treatment included immobilization in 26 patients. The mean length of hospital stay was 3 days. Instrumental extraction was a significant factor in the occurrence of newborn craniofacial trauma (p= 0.0001). Macrosomia was a risk factor for brachial plexus palsy (p= 0.03). Breech presentation was a factor in the occurrence of lower limb fractures (p= 0.001). One hundred percent of breech presentations had a bone lesion. The mortality rate was 33.3% (n=13). Perinatal asphyxia was the main cause of death (n= 23; 59%).



**Figure 1:** The various types of trauma.

### Discussion

Despite improvements in pregnancy monitoring and maternity unit technical facilities, trauma to newborns during birth is still a major concern in the paediatric setting. Maternal and fetal factors, such as pre-existing diabetes, macrosomia, shoulder dystocia, abnormal fetal presentation and the use of instruments during delivery significantly increase the occurrence of obstetric trauma. The hospital frequency was 1.9 ‰ in our study. This frequency is similar to that seen in the series by Mah E.M. et al. [19]. It is largely low compared with other series. Our study included hospitalized cases only. Simple cases, which are probably more numerous, are treated as outpatients. Sex ratio was 1.29 in boys' favor. This male predominance is similar to that found in several studies [7,8,19]. There is no convincing scientific explanation for this male predominance. A study conducted at CHU Treichville in Côte d'Ivoire found a predominance of females [20]. The characteristics of newborns are outlined in (Table 1) Maternal age was not a factor contributing to newborn trauma (Table 2).

Parameters	Number	Percent
<b>Gestational age</b>		
Pre-term	6	15,4
Term	33	84,6
<b>Apgar score at 5 min</b>		
<4	7	18
4-7	16	41
≥7	16	41
<b>Age of newborns</b>		
< 24H	35	90
1-7 Hours	3	8

>7 Hours	1	2,6
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**Table 1:** Characteristics of the newborns.

Parameters	Numbers	percent
<b>Age of mothers</b>		
< 20 ans	4	10
20-34 ans	30	77
>34 ans	5	13
<b>Parity of mothers</b>		
Primiparous	13	33,3
Pauciparous	11	28,2
Multiparous	15	38,5
<b>Mother prenatal follow-up</b>		
< 4 consultations	11	28,2
≥4 consultations	19	48,7
0 consultation	9	23
<b>Fetal presentation</b>		
Apex	19	49
Breech	14	36
Transverse	4	10
face	2	5
<b>Routes of delivery</b>		
Vaginal delivery		82%
Cesarean section		18%
<b>Cesarean indications</b>		
Procida shoulder	4	57
Breech presentation + anoxia	2	28
Face presentation + anoxia	1	14
<b>Instrumental extractions</b>		
Cupping	7	18
forceps	2	1
None	30	77

**Table 2:** Characteristics of mothers.

The average age was 27 years (range 17- 38). In the Sahel in general, and particularly in Mali, girls get married early. Primiparity is a major factor in perpartum trauma in newborns, especially if associated with other factors such as macrosomia and shoulder dystocia [21-23]. In our series, the percentage of primiparity was 33.3% lower than that of Louay K. [7]. It is statistically comparable with those of Samaké M. and Mah E.M. et

al. [8,19]. A high mortality rate was observed in neonates born by primiparous mothers (46.2%). This finding does not differ from those reported in the literature, where cephalic presentation is the most frequent [7,8,24].

However, breech presentation is considered a major risk factor. It requires the use of various obstetric manipulations that can traumatize the newborn. In our series, 12 out of 14 fetuses had a breech presentation. These fetuses required obstetrical maneuvers. Caesarean section is indicated for breech presentations, in order to reduce the rate of intrapartum trauma to the newborn. Charmaine et al. studied the incidence of birth trauma according to the route of delivery (vaginal versus caesarean). They have concluded that only fractures and paralysis of the brachial plexus were significantly specific to vaginal delivery, while the incidence of other localizations did not differ according to the mode of delivery [25]. If there is any doubt about the possibility of vaginal delivery, Caesarean section should be performed to preserve the functional and vital prognosis of the newborn. In our study, the caesarean delivery rate was 18%, including 14.3% cases of craniofacial trauma. Attempted vaginal deliveries are partly responsible for these rates. This raises the question of the quality of monitoring both of pregnancies and of the delivery procedure in our facilities. Instrumental extractions are performed to reduce the mortality and morbidity of the fetus in distress. Neonatal morbidity attributable to this procedure depends on the quality of the maneuver. In our series, the use of instruments was found in 23% of deliveries. This percentage is very similar to that of Charusheela et al. 26% [26].

However, this rate is higher than that of Samaké M. (10%) [8]. The use of instruments during birth in developed countries is declining. The type of instrument used varies from center to center, with the vacuum cup being the most widely used in our series and that of Louay K. [7]. Compared with other centers, this may be due to the less frequent use of forceps in our delivery units. Macrosomia is a major risk factor for trauma in childbirth [27]. D. Bouabida, et al. reported cases of brachial plexus paralysis in 2.1% of deliveries of macrosomic fetuses [28]. The rate of macrosomic neonates in our series was similar to that of Samaké M (14%) [8]. The failure of pregnancy follow-up (33.3%) in our series and early detection of fetopelvic disproportions would explain this association between macrosomia and trauma during delivery. 25.6% of cases in our series had craniofacial trauma. In our study, there was a statistically significant association between the presence of cranial lesions and the use of instruments during delivery ( $p = 0.01$ ). Several risk factors have been described as contributing to brachial plexus palsy, including macrosomia and shoulder dystocia. The main risk factors in our sample were macrosomia and cephalic presentation, with statistically significant  $p < 0.03$  and  $p < 0.01$  respectively. In our series, fracture of the

long bones accounted for 33.3% of all lesions observed. This rate is high compared with that of Guèye M. (Senegal) (8.9%) and E.M Mah et al. (9%) [24, 19]. With regard to clavicle fractures (Figure 2), our result (5.1%) is low compared with that of the other three African authors [7, 19, 24]. Various studies have correlated the occurrence of neonatal bone fractures with risk factors such as macrosomia, shoulder dystocia, a prolonged active phase of labor and the use of instruments during delivery [29, 30, 31].



**Figure 2 :** Clavicle fracture.

In contrast, other authors have failed to find a significant association between these factors and bone fractures [32]. In our series, no factors were identified. However, it should be noted that breech presentation was observed in 70% of newborns with a bone lesion. Our rate of multiple association of lesions (20.5%) was higher than those of Bassam H et al. and Nandiolo et al. [32, 20]. In our series, six cases had a double location (15.4% of patients); two patients had three lesions (5.1%). The mortality rate in our series was lower than that of E.M. Louay, but still high. We observed a high mortality rate in the group with a single bone lesion, but this could also be explained by the fact that bone lesions represent the majority of traumas encountered. Polytrauma increases the risk of death. We noted a certain correlation between a low Apgar score and a notion of perinatal anoxia. Resuscitated neonates had a high morbidity and mortality rate.

### Conclusion

Newborn birth trauma remains a major concern in neonatology in our country. Better monitoring of pregnancy and improvement of technical skills in maternity facilities will reduce the morbidity and mortality associated with this disorder. A nationwide study will be able to better define the magnitude of the issue.

### Ethical considerations

Upon admission, patients' parents or legal guardians approved their enrolment in a clinical research project. The national ethics committee has approved the research protocol.

## Conflicts of interest

The authors have not declared any conflicts of interest.

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