



## Neonatal Obstetrics Fractures: Incident, Risk Factors and Management Outcome in North-West Nigeria

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### Abstract

**Background:** Obstetric fractures following birth injuries in newborns are not rare in our practices unlike in the developed climes. It may cause anxiety, socioeconomic and emotional challenges to the patient's relatives and a major concern to health care providers especially the attending physicians. These fractures can also cause a spectrum of morbidity/deformity if not well managed. Publications on the incident, risk factors, management and its outcomes are scarce in literature search. We analyzed our experiences regarding this study in Usmanu Danfodiyo Teaching Hospital, Sokoto, Nigeria.

**Objectives:** The objectives of this study are (1) To determine the incidence of obstetric neonatal fractures (2) To identify the common risk factors of obstetric neonatal fractures and (3) To examine the management outcome in the study centre.

**Type of study:** Retrospective cross-sectional analytical study.

**Methods:** The diagnoses of obstetric fractures or injuries were traced from the hospital health record department. Seventy-five cases of obstetric fractures were seen, evaluated and managed between January 2018 and December 2020. The demographic details, incident, risk factors during birth, mode of delivery, type and sites of fracture, and management used with outcomes were documented. The findings were analyzed using SPSS version 24.

**Results:** Seventy-five cases were recruited. Thirty-three babies were delivered in UDUTH while forty-two were delivered at home and peripheral hospitals. Mean gestational age was 37.6 weeks (ranging from 35 to 41 weeks). Mean time for the diagnosis or consultation by an orthopedic surgeon was 3.7 days (ranging from few hours to 11 days). Most patients had difficulty deliveries: breech presentation by SVD (9.3%), breech presentation by caesarean section (6.7%), cephalic presentation by SVD (52%), cephalic presentation by caesarean section (16%), cephalic presentation with assisted instrumental delivery (9.3%) and cephalic presentation with shoulder dystocia (6.7%). Out of the 33 cases delivered in UDUTH, majorities (26.7%) were not booked and had no antenatal assessment and care. Majority (62.7%) of all the studied cases had prolonged labor duration while 37.3% had normal duration of labor. Our study revealed incidence of obstetric fracture in our hospital (UDUTH) is 1.169 per 1000 deliveries.

The frequencies of the fractures are tibia with or without fibula (4%) femur (34.7%), clavicles (37.3%), and humerus (24%). The treatment offered for the fractures include: Watchful waiting/observation with instructions on positioning (62.7%) and splint with plaster of Paris (37.3%). All patients showed complete union at the end of 6 weeks with no residual deformity or limb length discrepancy at the end of 16 weeks. A significant number of the patients were lost to follow up after 16 weeks with only 13% had follow up to 6 months.

**Conclusion:** The occurrence of neonatal obstetric fractures is not rare in our settings. Obstetricians and neonatologists should routinely practice thorough clinical examinations for any new born with obstetrics trauma risk factor(s) and when in doubt early orthopedic surgery consultation will help in early diagnosis and appropriate management. Type of management is guided by many factors with patient's neonatal condition well taken into consideration. This study revealed satisfactory outcome. Efforts should be made at peripheral hospitals towards obstetric care, early referral of high-risk pregnancies to specialists as well as public enlightenment against home deliveries of babies.

**Keywords:** Neonate; Obstetric fracture; Risk factors; Incidence; Management

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Received Date: 03 Aug 2021

Accepted Date: 24 Aug 2021

Published Date: 30 Aug 2021

#### Citation:

Ajiboye LO, Nwashili CR, Adoke A, Jega R. Neonatal Obstetrics Fractures: Incident, Risk Factors and Management Outcome in North-West Nigeria. *World J Surg Surgical Res.* 2021; 4: 1332.

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## Introduction

Neonatal obstetric fractures and other injuries that occur due to trauma during the process of childbirth are very rare [1]. Neonatal Obstetric fractures can cause significant increase in neonatal morbidity despite improved obstetric and perinatal care especially in developing nations and in abnormal birth weight and preterm babies. Generally, the obstetric injuries in a new born may range from a minor bruise, swelling, from instrumented delivery (e.g. forceps) or nerve palsies and fracture or their combinations. Injuries to the infant during the birth process results from mechanical forces (i.e., compression, traction) due to multitude of factors which may lead to or coexist with hypoxic-ischemic insults [2].

Any bone could be involved in the injury; however the clavicle, humerus, femur or any other long bone are the most commonly fractured. The risk factors may be low birth weight, high birth weight, difficult delivery, abnormal fetal presentation and available hospital facilities as well as skills of attending health care givers. The value of caesarean section in reduction of these birth injuries is not certain [3,4]. Although, there are publication and reports on birth fractures but the details on their incidence, implicated risk factors, management or treatment modalities, and treatment outcome are scarce in the literature from this part of the world. We analyzed our experience in this part of the world.

## Patients and Methods

A three-year retrospective study of obstetric fracture cases between January 2018 and Decembers 2020 was conducted. In this study, "Obstetric fracture is referred to fracture of bone(s) during delivery either by surgical (Caesarean section), instrument-assisted or spontaneous vertex (vaginal) deliveries following obstetric trauma.

The patients were reviewed within few hours to some days after delivery either in the clinic or on admission in the hospital. Case notes and antenatal clinic records of the mothers of the patients (patients' mothers) who met the defined criteria during the study period were retrieved from the health records department using the keyword diagnoses as 'Obstetric fracture, Obstetric Trauma or Obstetric injuries'. Relevant information like sex, birth weight, gestational age, presentation and mode of delivery, site of the fracture, other injuries suffered, coexisting medical disease along with treatment modality used as well as important patients' parents socio-demographic data, antenatal care, investigation results, and treatment outcome information were extracted and entered into an already prepared proforma for the study purpose. The inclusion criteria were neonatal fracture during the process of delivery and patients managed for this condition in our hospital. Post-delivery fractures, patients with non-fracture injuries and those with incomplete health records were excluded from the study. The fracture location and its classification were taken into consideration in addition to individual descriptive diagnosis of cases and these were tabulated accordingly. Data were analyzed using SPSS version 24 (SPSS Inc. Chicago, Illinois, USA) and presented in form of tables, ratios and percentages. The study involved 75 cases which were either referred to orthopedics outpatient clinic or reviewed on admission at Special Care Baby Unit (SCBU) after deliveries in obstetrics department (labor room) of the hospital following suspected or confirmed injuries.

## Results

The cohort of 75 cases with birth-related fractures who had complete documentation was studied. Sixty-six (88%) of the cases were singletons while 9 (12%) were multiple gestations (8 sets of twins and a triplet). Forty-one females and thirty-four males with weight

**Table 1:** The Distribution of the involved bones, frequency, fracture patterns and types of treatment.

S/N	Bone	Fractures pattern	Frequency	Treatment types			Total	Percentage (%)
				WW/ O	POP	Op		
1	Clavicle	Greenstick	13	13	0	0	28	37.30%
		Transverse	7	7	0	0		
		Obligues	8	8	0	0		
2	Humerus	Greenstick	7	6	1	0	18	24%
		Transverse	6	4	2	0		
		Obligues	5	3	2	0		
3	Radius/Ulna	Greenstick	1	1	0	0	2	2.70%
		Transverse	0	0	0	0		
		Obligues	1	0	1	0		
4	Femur	Greenstick	7	2	6	0	24	32%
		Transverse	6	0	6	0		
		Obligues	7	0	7	0		
5	Tibia	Greenstick	2	0	2	0	3	4%
		Transverse	1	0	1	0		
		Obligues	0	0	0	0		
	Total		75	47	28	0	75	100%

**Key:** WW/O: Watchful Waiting/Observation; POP: Casting with Plaster of Paris; Op: Operation

### Comments:

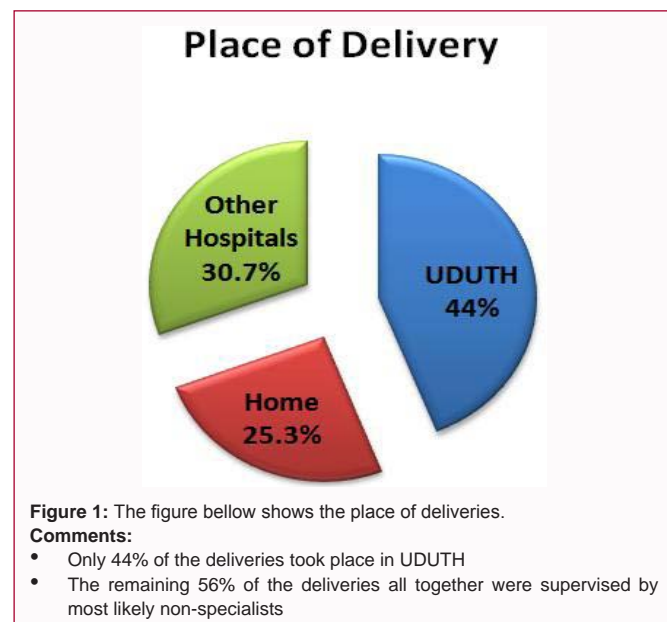
- The commonest fracture bone is clavicle (37.3%).
- The least fractured bone is radius/ulna (2.7%).
- 47(62.7% of) cases were managed by watchful waiting/Observation.
- Majority (40%) of the fracture was greenstick.

**Table 2:** Risk factors for obstetrics fracture among the cases.

S/N	Risk factors	Frequency	Percentages
1	Abnormal presentation	5	6.70%
2	Prolonged labour with difficult delivery	10	13.30%
3	Macrosomia	3	4%
4	Untrained birth attendants/ Home delivery	13	17.30%
5	Osteogenesis imperfecta	2	2.70%
6	Multiple gestations	6	8%
7	Caesareans Section	11	14.70%
8	Prematurity	7	9.30%
9	Unknown	3	4%
10	<b>Multiple risk factors</b>	<b>15</b>	<b>20%</b>

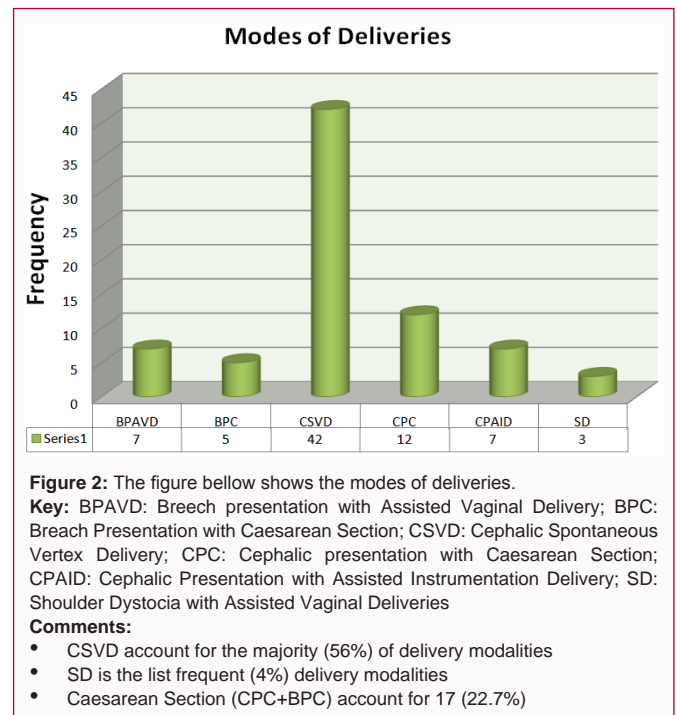
**Comments:**

- **\*Multiple risk factors were noted in 15 cases (20%).**
- Majority (20%) of the fractures occurred as a result of combinations of risk factors.
- Untrained birth attendants/ Home delivery accounted for highest (17.3%) single risk factor.



range of 1.9 kg to 5.2 kg (mean birth weight of 2.64 kg). Sixty-eight (90.7%) of the patients were delivered at term while seven (9.3%) of them were pre-term. The mean gestational age at delivery was 37.6 weeks (ranging from 34 to 42 weeks). Mean time for the diagnosis or consultation by orthopedic surgeon was 3.7 days (ranging from few hours to 11 days).

Thirty-three (44%) babies were delivered in UDUTH while forty-two (56%) were delivered outside UDUTH facility (19 cases (25.3%) at home and 23 cases (30.7%) peripheral hospitals). Most patients had difficulty deliveries: Breech presentation by SVD (9.3%), breech presentation by caesarean section (6.7%), cephalic presentation by SVD (52%), cephalic presentation by caesarean section (16%), cephalic presentation with assisted instrumental delivery (9.3%) and cephalic presentation with shoulder dystocia (6.7%). Out of the 33 cases delivered in UDUTH, majorities (26.7%) were not booked pregnancies and had no antenatal assessment and care. Majority (62.7%) of all the studied cases had prolonged labor duration while 37.3% had normal duration of labor. The study revealed incidence of



obstetric fracture of 1.196 per 1000 deliveries.

The management of the patients was based on individual case peculiarity like patient maturity (gestational age at delivery), in or out patients and fracture characteristics. Treatment modality was decided depending on the location, types and site of fracture as well as deformities as shown in Table 1.

All patients had complete union at the end of 6 weeks with no residual deformity, angulations or limb length discrepancy at the end of 16 weeks. A significant number of the patients were lost to follow up after 16 weeks with only 13% followed up to 6 months.

**Discussion**

Fractures may occur due to significant mechanical forces at any point in time in the series of events during the process of childbirth due but not limited to relatively small birth canal, relatively big fetus, relatively mal-positioned fetus during delivery process or inappropriate pulling of fetus by the birth attendants especially by non-professional traditional birth attendants [2-6]. Our study showed that many (56%) of the fractures occurred among the home-delivered babies and those who had delivery supervision by non-professionals in remote villages of the study centre. Such untrained individuals are present in their numbers in areas remote from the study center where most babies were referred from. The majority of route of deliveries in the study were through Cephalic Spontaneous Vertex Delivery (CSVD) which is the normal and physiology rout of baby delivery as shown in the literatures [3-8].

The study also recorded clavicle as the commonest fractured bone with frequency of 37.3%. The frequency of the clavicle fractures is in-keeping with reports from many studies as the commonest obstetric fractures while the fractures of other bones especially femur are considered rare in newborns and has been described with difficult deliveries [6-10].

The incidence of obstetric fracture in this study for the babies only delivered in the study centre is 1.196 per 1000 deliveries, this

incidence does not account for the deliveries out the study centre. The reported incidence in the literatures varies widely and between 0.13 and 0.087 per 1,000 deliveries [4,6-9]. The reason for a relative higher incidence of obstetric fractures this study may be partly due to higher number of unbooked pregnancies and complicated labors referred to the centre during labor. However, Pius et al. in Maiduguri, at North-East part of Nigeria reported a very high incidence of 5.7 per 1000 [5]. It was noted that Pius et al. based the incidence reported from their study on the cases admitted for the care in the hospital and not the cases delivered in their study centre.

The mechanisms and risk factors of obstetrics fracture in new born have been well described. It may happen in the context of mal-presentation, low birth weight, macrosomic baby and difficult or precipitous delivery [6,8]. In this study, the risk factors noted with varied frequency includes (Table 2) abnormal presentation, prolonged labor with difficult delivery, macrosomia, untrained birth attendants/home delivery, Osteogenesis imperfecta, multiple gestations, Caesareans Section, prematurity. Unknown and multiple risk factors. Our findings showed combination of risk factors accounted the highest frequency followed by untrained birth attendants/home delivery. These huge contributions of these risk factors are understandable because the poor technical knowhow of untrained individuals attending to deliveries especially the challenging cases. Caesarean section was projected initially as a means to reduce birth injury [10], however, there are studies with contrary findings especially in those who frequently use small vertical infra-umbilical incisions which is likely to cause limited space for maneuver to deliver the baby during the obstetric procedures [10-13] or as a result of poor maneuvering techniques and poor delivery techniques by the birth attendant [12,13]. Generally, the routes or modes of deliveries are difficult to examine as risk factors in a study like this because the deliveries of the babies with obstetric fractures were conducted at different places and supervised by the people with a wide range in obstetric skills. The main mechanism of injury that leads to fractures are also difficult to understand in the study, but could be assumed to be most likely excessive traction/pulling, mother's abdominal compression to aid bear down, torsional or rotational forces leading to spiral fracture and incomplete fractures (green stick fractures) as represented by many (40%) of the fracture patterns.

Besides the different supportive care for those were admitted into Special Care Baby Unit (SCBU) of the hospital, specific treatment of the fracture was mostly non-operative care. Casting with plaster of Paris was done for 28 (37.3% of) cases while 47 (62.7% of) cases were managed by watchful waiting/observation. The watchful waiting/observations entailed guided or supported limb/patient position, protective patient carriage and protective baby care. This was used essentially for those who were admitted as case of neonatal sepsis, presumed sepsis, prematurity and other clinical conditions. Casting was used essentially for those with complete fractures and with fracture pattern of higher risks of fracture displacement. There were two patients with osteogenesis imperfecta who had a fracture of shaft of femur and tibia and one with tibia was managed with by guided watchful waiting, while that of femur was manage with cast and both had complete union. The two cases of osteogenesis imperfect also had intravenous pamidronate. The treatments were all monitored for both in and outpatients all patients had complete fracture union at the end of 6 weeks without residual deformity or limb length discrepancy at the end of 16 weeks. However, significant number of the patients was lost to follow up after 16 weeks with only 13% followed up to 6

months. The outcome from this study is similar to good outcome of treatment reported in some other similar studies of the management of obstetric neonatal fractures [14].

## Conclusion

Neonatal obstetric fractures are not rare in our settings. Obstetricians and Neonatologists are encouraged to practice thorough clinical examinations for any new born with obstetrics trauma risk factor(s) or with a challenging labor process and when in doubt early orthopedic surgeon consultation will help in early diagnosis and appropriate management. Type of management should be guided by many factors with patient's neonatal condition well taken into consideration. This study showed that obstetric fracture management has an excellent prognosis at both short and long-term follow-up if appropriate management is instituted. Efforts should be made at peripheral hospitals towards obstetric care, early referral of high-risk pregnancies to specialists as well as public enlightenment against home deliveries of babies.

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