

# Causes and Treatment of Birth Trauma-Related Femoral Fracture: A Longitudinal Study

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## ABSTRACT

**Aim:** To determine the causes and treatment of birth trauma related femoral fractures.

**Study design:** A longitudinal study

**Place and Duration:** This study was conducted at DIMC, Dow University of Health Sciences, Karachi from January 2021 to January 2022.

**Methodology:** The study included cases of femoral fractures in neonates caused by birth trauma. The cases of birth histories were investigated in terms of gestational age, birth weight, and mode of delivery. The category of femoral fractures and the treatment performed were both noted. Cases were followed until they were recovered. A comprehensive clinical examination was performed. Other birth traumas, fractures, nerve palsies, and/or symptoms of other musculoskeletal, genetic diseases, such as blue sclera and hypermobile joints (osteogenesis imperfecta), were noted.

**Results:** A total of 15 newborns with femoral fractures were included in this study. The average gestational age was 38.2 weeks, with an average diagnosis time of 3 days. In the majority of cases, the infant was born breech and delivered via Caesarean section. Eleven instances had mid-shaft fractures, while four had subtrochanteric fractures. After an average of 3.1 weeks, all patients had a complete union.

**Conclusion:** A femoral fracture in a neonate due to birth related trauma is quite uncommon. It occurs more frequently in Caesarean sections performed for breech presentation. Preterm and/or low birth weight newborns are at a higher risk. The femur shaft is commonly fractured. The prognosis for these fractures is excellent, and they heal completely after immobilization.

**Keywords:** Birth Trauma, Femoral Fracture, Management, Risk Factors

## INTRODUCTION

Fractures can happen due to severe mechanical forces at any stage throughout the delivery process. (1) Clavicle fracture is the most common type of fracture. Femur fractures in babies are uncommon; however, they have been linked to difficult births. (2) The incidence has been observed to range between 0.13 and 0.077 per 1,000 deliveries. (1) With a vaginal birth, the mechanisms of femur damage have been documented. (3) Malpresentation, difficult or precipitous delivery, and low birth weight are all possibilities. (4)

The likelihood of fractures is thought to be lower after a Caesarean section. Many reports in the literature have catechized this consideration. (5) The common use of a low segment vertical incision to avoid maternal morbidity, when combined with emergent indications such as a breech presentation or obstructed labor, may increase the risk of child injury during Caesarean section. (6) Other risk factors for this injury include osteogenesis imperfecta and preterm osteopenia. (7, 8)

This patient group received treatment from a variety of sources. Overhead traction is simple to use and offers adequate immobilization. Skin sloughing, Volkmann ischemia contracture, the necessity for repeated readjustments, and the potential to interfere with mother-infant attachment have previously reported. (9) In a home setting, when medical care is not available, these difficulties make gallow traction less appealing. Furthermore, the extended hospital stay necessitated has major financial and social consequences for the patient and his or her family. As a result, only one patient was treated with gallow traction during a prolonged hospital stay. (10)

Although numerous reports on femoral shaft fracture have been published, the risk factors, features, and treatment options are still unknown. The goal of this study, which includes a prospective study of 15 babies with femur fractures, is to shed light on the relevant factors and treatment strategies.

## METHODOLOGY

Permission was taken from the ethical review committee of the institute. All neonates' parents gave their written informed consent. All parents were asked to provide a thorough background, with a focus on their birth history. Birth records were received from the concerned Obstetrics department. Details of the mother's obstetrical history, including any sickness during pregnancy, such as diabetes, were requested. The length of pregnancy, the mode of delivery, and any difficulties that occurred during delivery were all noted. The baby's birth weight was written down. A comprehensive clinical examination was performed. Other birth traumas, fractures, nerve palsies, and/or symptoms of other musculoskeletal, genetic diseases, such as blue sclera and hypermobile joints (osteogenesis imperfecta), were noted. The type and severity of the femoral fracture were documented. The treatment modality was determined by the location of the fracture and its angulation. Femoral subtrochanteric fractures were treated with a Pavlik harness, while shaft fractures were treated with a spica cast. In the outpatient department, all patients were followed on a weekly basis. By four weeks, they were all pain-free, and healing had begun.

## RESULTS

Femoral fractures occurred in 15 newborns as a result of birth trauma. There were ten males and five female newborn. The average gestational age of the newborns was 38.2 weeks (range from 33 to 40 weeks). The 2.5 kilograms was the average birth weight (range 2.1 to 3.5 kg). Four days was the average age of presentation. (As shown in Table 1)

Four babies were born to diabetic mothers. Nine of the mothers were primigravidae, whereas the other six were multigravidae. Mothers were, on average 29 years old (range 24 to 40 years). The delivery method was vaginal in six cases and Caesarean section in nine cases. In four of the instances delivered vaginally, the baby was cephalic, and two were breech. There was one instance of delivery using exit forceps. Breech's presentation,

cephalic, and two ignored transverse lies were among the cesarean section babies. A case of blocked labor was a neonate with cephalic presentation. There were six emergency cesarean sections and only three elective cesarean sections. The average time to diagnose a fracture was three days (range 1 to 6 days). Nine cases affected the right femur, whereas six included the left. One newborn had a both humerus and femur fracture. The features of that newborn suggested osteogenesis imperfecta. In 11 cases, the femur's midshaft was shattered. There were four subtrochanteric fractures reported. No neonate displayed any dysmorphic characteristics. Fracture healing took an average of 3.1 weeks. There were no non-unions reported. By 4 weeks, all fractures had healed well. (As shown in Table 2)

Table 1: Characteristics of Neonates Due to Birth related Femoral Fractures (n=15)

Gender	
Male	10
Female	5
Mean Gestational age at birth (weeks)	38.2
Preterm	3
Mean Birth weight (kg)	2.5
Mean age at presentation (days)	4

Table 2: Femoral Fractures characteristics

Laterality	
Right	9
Left	6
Mean Diagnosis Time (days)	3
Fracture Type	4
Subtrochanteric	11
Mid shaft of femur	
Mean Healing Time (weeks)	3.1

## DISCUSSION

The differential diagnoses for a femoral fracture (FF) in an infant include osteomyelitis, osteogenesis imperfecta, and metabolic bone diseases. Eherenfest was the first to report a FF during a cesarean section in 1922. (11) In a mother with diabetes and a uterine myoma, he described a midshaft fracture after cesarean birth. Denes and Weil reported three children who had femoral fractures due to forceful separation of the proximal femoral epiphyses during cesarean section. (12)

Torsion injury resulting in spiral fracture of the femur shaft has been proposed as the most common mechanism of injury. (13) The bulk of the fractures in our dataset were of the same type. If the breech is fixed at the pelvis, excessive traction on the leg during vaginal breech delivery could result in a femoral shaft fracture. (1, 5) In our study, the rate of femoral fractures in our hospital was 0.067 per 1000 births.

In our analysis, the cesarean section was shown in 9 of the 15 instances (60 %), matching Kancherla R et al's findings of 6/10 (60 %) instances. Though Caesarean section was previously thought to reduce this type of harm, many studies have revealed that the opposite is true. (14) Givon and colleagues looked at how newborns with femoral fractures were treated. A higher incidence of femoral fracture during caesarean delivery was also reported (73 % of fractures occurred during caesarean section). (15) One cause could be that these patients have less room for mobility during obstetric procedures. Poor relaxation, poor delivery skills, and a tiny incision are all possible causes. In the majority of cases, the infant was born breech, requiring leg traction to deliver the baby through a small transverse uterine incision. When senior staff members were unavailable, the majority of caesarean sections were performed by junior doctors.

In the available research, the role of gender in fracture risk has not been investigated. The majority of the newborns (n = 7) in Givon et al's analysis of 11 cases were female. (15) However, there were ten times as many males (n = 10) as females (n = 4). As a result, we could not make any conclusions about the influence of gender on fracture risk. The average gestational age of our patients

at the time of diagnosis was 38.2 weeks. Three of our children were born prematurely. The average birth weight of the neonates was 2.5 kg. Five of the fifteen were born with a birth weight of less than 2.5 kg, which is considered low.

In our research, we employed a spica cast for femur shaft fractures and a Pavlik harness for subtrochanteric fractures. Bryant traction was not used since it needs inpatient care, and it is difficult to hold the newborn in this posture. (16) Furthermore, skin issues are more common in small infants due to their weak and delicate skin.

There are certain limitations to our research. The majority of our cases were first detected after a referral from a neonatologist or obstetrician based on suspicion, perhaps missing a hidden fracture. In the event of a difficult birth, a thorough screening protocol by the neonatologist would be quite beneficial. Our findings may not be generalizable due to our small patient sample size.

## CONCLUSION

Femoral fractures after delivery, while uncommon at first, should be suspected, especially in complicated cesarean procedures. Obstetricians should be aware that the risk of femoral fracture is higher than in vaginal birth while dealing with prolonged labor that started as a breech and concluded in caesarean surgery. In the event of a questionable presentation, a thorough clinical examination and competent orthopaedic consultation would be beneficial. The prognosis for these fractures is excellent, and they heal completely after immobilisation.

**Funding source:** None

**Conflict of interest:** None

**Permission:** Permission was taken from the ethical review committee of the institute

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