

Risk Factors and Management of Birth Related Femoral Fracture

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ABSTRACT

Objective: To evaluate the risk factors and management of femoral fractures related to birth trauma.

Study Design: Descriptive Case series Study

Place and Duration of Study: This study was conducted in Department of Orthopaedics & Traumatology and Department of Obstetrics & Gynecology of Khyber Teaching Hospital, Peshawar from April 2008 to March 2013.

Materials and Methods: Over a period of 5 years, cases of femoral fractures in newborns due to birth trauma presenting to Orthopaedic & Traumatology department or occurring in Obstetrics & Gynecology Department of Khyber Teaching Hospital Peshawar were recruited to the study. Birth histories of the cases were explored with respect to period of gestation, birth weight, presentation at birth and mode of delivery. Type of fracture and management used was documented. Cases were followed till recovery.

Results: Mean gestational age was 38.1 weeks and mean time to diagnose was 3 days. Presentation of baby was breech and mode of delivery was Caesarean section in majority of cases. Mid shaft fracture was present in ten cases and three had subtrochanteric fracture. All patients showed complete union at a mean duration of 3.2 weeks.

Conclusion: Femoral fracture due to birth trauma in newborn is a rare injury. It is more common in cases of Caesarean section done for breech presentation. Risk is high in preterm and/or low birth weight babies. Fracture mostly involves shaft of femur. These fractures have very good prognosis and show complete healing following immobilization.

Key Words: Femoral Fracture, Birth Trauma, Risk Factors, Management

INTRODUCTION

Fractures may occur due to significant mechanical forces at any point of time in the series of events in childbirth.¹ The most common fracture usually encountered is that of clavicle.² Fracture of femur is considered rare in newborns and has been described with difficult deliveries.³ The reported incidence varies between 0.13 and 0.077 per 1,000 deliveries.^{3,4} The earliest case of femoral shaft fracture in a newborn was reported in 1922 following a difficult breech delivery.⁵ Since then, much literature has been published regarding the possible aetiology, risk factors and management of this injury.^{3,4,6}

The mechanisms of injury to femur have been well described with vaginal delivery. It may happen in the context of malpresentation, low birth weight, macrosomic baby and difficult or precipitous delivery.^{2,4,7} Caesarean section is presumed to reduce the risk of fractures. This consideration has been catechized in many reports in the literature.^{8,9,10} The prevalent use of low segment vertical incision to reduce maternal morbidity compounded by difficult indications such as breech presentation or obstructed labour may increase the incidence of neonatal injuries in Caesarean section.^{9,11,12,13,14} Other risk factors associated with this injury include osteogenesis imperfecta and osteopaenia of prematurity.^{15,16}

Several treatment modalities are used for treatment. The basic principle underlying these is strict immobilization

of the femoral shaft.^{14,17,18} The proximal fragment is flexed, abducted and externally rotated in case of subtrochanteric fracture of femur. Simple strapping of the thigh to the trunk in the same way as a Pavlik harness to achieve reduction by bringing the distal fragment in alignment with the proximal one is effective.^{14,17,19} Fractures of the shaft of femur are usually encountered with minimal angulation and are best managed with toe-groin cast or hip spica until the fracture becomes sticky.^{17,19,20}

MATERIALS AND METHODS

The study included a cohort of all newborn babies with age less than one week, with femoral fracture due to birth trauma presented to the Orthopaedic & Traumatology Department or Obstetrics & Gynaecology Department of Khyber Teaching Hospital from April 2008 to March 2013. Written informed consent was taken from the parents of all newborns. A detailed history with particular emphasis on birth history was taken from all parents. Birth records from the concerned Obstetrics department were obtained. The help of second author was taken in this regard. Details of obstetrical history of the mother with respect to any illness during pregnancy like diabetes were sought. Period of gestation at the time of delivery, mode of delivery and any complications during birth were recorded. A note was made of birth weight of the baby. A thorough clinical examination was carried out. Presence of other birth injuries, fractures, nerve palsies

and/or stigmata of other musculoskeletal, metabolic and/or genetic disorders like presence of blue sclera and hypermobile joints (osteogenesis imperfecta) was documented. Type and extent of femoral fracture was recorded. Treatment modality was decided depending on the site of fracture and angulation at the site. Femoral fractures in the subtrochanteric region were managed with Pavlik harness, while fractures of the shaft were managed in a spica cast. All patients were followed on a weekly basis in the outpatient department. All of them were pain free by 4 weeks, and healing had occurred by then. Pavlik harness and spica cast both were removed at the end of 4th week.

RESULTS

There were 13 newborns with femoral fractures due to birth trauma. There were 9 males and 4 female neonates. Mean gestational age was 38.1 weeks (range 34 to 41 weeks) with 3 preterm neonates. The mean birth weight was 2.6 kg (range 2.1 to 3.5 kg). Mean age was 4 days. All neonates were born in our hospital obstetric department.

Table No. 1: Characteristics of Neonates with birth related femoral fractures (n=13)

Gender	Males=9 Females=4
Gestational age at birth(weeks)	Mean= 38.1
Preterm	n= 3
Birth weight(kg)	2.6 kg
Age at presentation(days)	Mean=4

Table No. 2: Characteristics of Femur fracture

Laterality	Right: n=8 Left: n= 5
Time to diagnosis(days)	Mean= 3
Type of fracture	Subtrochanteric:n= 3 Mid shaft of femur: n= 10
Time to heal(weeks)	Mean= 3.1

Three neonates were born to mothers with diabetes. Eight mothers were primigravidae and 5 were multigravidae. Mean age of mothers was 30 years (range 25 to 39 years).

Mode of delivery was vaginal in 5 and Caesarean section in 8 cases. In the cases delivered vaginally presentation was cephalic in 2 and breech in 3. There was one case of outlet forceps delivery. Among the group delivered by caesarean section 6 were breech presentation, one cephalic and one neglected transverse lie. Neonate with cephalic presentation was a case of obstructed labour. There were 7 emergency and only one elective caesarean section.

Mean duration to diagnosis of fracture was 3 days (range 1 to 5 days). Right femur was involved in 8

and left in 5 cases. One neonate had fracture humerus along with femur. That neonate had features suggestive of osteogenesis imperfecta. Midshaft of femur was fractured in 10 cases. There were 3 cases of subtrochanteric fracture. No neonate had any dysmorphic features.

Mean time of fracture healing was 3.1 weeks. No non union was recorded. All fractures showed satisfactory union by 4 weeks.

DISCUSSION

The differential diagnosis of femoral fracture in a newborn includes osteomyelitis, osteogenesis imperfecta, child abuse, and metabolic bone diseases. Eherenfest⁵, in 1922, was the first to report a femoral fracture during caesarean section. He described a midshaft fracture during caesarean section delivery in another with diabetes and a uterine myoma. Similarly, Denes and Weil²¹ reported three infants with femoral fractures during caesarean section due to traumatic separation of the proximal femoral epiphyses.

The mechanism of injury has been postulated to be most commonly torsional injury leading to spiral fracture of the shaft of femur⁴. Most of the fractures in our series were of the same type. In the case of vaginal breech delivery, excessive traction on the leg when the breech is fixed at the pelvis can lead to fracture of the femoral shaft.² Morris et al³, reporting in 2001 on their experience with femoral fractures occurring during delivery, found an incidence of 7 infants/52,296 deliveries, or 0.13 per 1000. In our study the incidence of femoral fractures was 0.077 per 1000 deliveries in our hospital.

In our study mode of delivery was caesarean section in 8/13 cases (61.5%) which correlates with the findings of Kancherla R et al¹⁴ who reported it in 6/10 (60%) cases. Though Caesarean section was postulated initially to decrease this pattern of injury, many contrary reports have shown a reverse incidence^{3, 10}. Givon and collaborators¹⁷ assessed the treatment of neonates with femoral fractures. They too noted the increased risk for femoral fracture during caesarean section (73% of fractures occurred during caesarean section). One reason could be the decreased space for maneuverability of obstetric procedures in these patients. Other causes may include poor relaxation, poor delivery techniques and small incision.⁷ In majority of cases presentation of the baby was breech which required traction on the legs to deliver the baby through a small transverse uterine incision. Most of the caesarean sections were done in emergency when senior staff was not available and surgery was done by junior doctors. Furthermore most of the women presented in advanced labour where the breech was already engaged or with the foot descended into the vagina and thus excessive traction was used to disimpact the breech to deliver the baby.

The role of gender in fracture risk has not been assessed in the published literature. In the study of 11 cases published by Givon et al¹⁷, most of the neonates were female (n = 7). However, we had more males (n = 9) than females (n = 4). Therefore, we could not draw any conclusions on the possible role of gender on fracture risk.

The mean gestational age at diagnosis in our patients was 38.1 weeks. We had two pre-term babies, the rest being full term. The mean birth weight of the babies was 2.6 kg. Of the thirteen, four of them were <2.5 kg, considered to be low birth weight. Thus, earlier speculated risk factors such as macrosomic post-term or pre-term babies might have less bearing whereas low birth weight in full-term pregnancies might prove to be influential in our country.

Diagnosis of femoral fracture was made after a mean period of 3 days (range 1–5 days) in our study. This is similar to the time period observed by Kancherla et al.¹⁴ The recommended modes of treatment for a fractured femur in neonates is conservative and includes a spica cast, the Pavlik harness, and Bryant traction. In our study we used spica cast for shaft of femur fracture and Pavlik harness for subtrochanteric fracture. We did not use Bryant traction because it requires inpatient care and keeping the neonate in this position is cumbersome. Moreover skin complications are more considering the fragile and delicate skin of small neonates.

Our study does have some limitations. Most of our cases were diagnosed only when a referral was sent to us by the neonatologists or obstetrician based on suspicion, leading to a possibility of missing an occult fracture. A thorough screening protocol by the neonatologist in the event of a difficult delivery would be quite helpful. Considering our small patient sample size, our findings may not be generalized.

CONCLUSION

Femoral fractures following delivery, though rare on presentation, should be looked out for, especially in difficult caesarean sections. When encountering a difficult labor, which started as a breech and ended as a caesarean section, obstetricians should bear in mind that the risk for femoral fractures is higher than in vaginal delivery. Thorough clinical examination and proper orthopaedic consult in the event of doubtful presentation would help. These fractures have very good prognosis and show complete healing following immobilization.

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