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Fractures At First Breath: Functional Outcomes Of Neonatal Femoral Fractures Following Complicated Labour

Dr. Rakesh Patil[*1], Dr. Sameer Ahamed J N[2], Dr. Rajesh B Naik[3]

[*1]Assistant Professor, Department of Orthopaedics, KLE Jagadguru Gangadhar Mahaswamigalu Moorsavirmath Medical College and Hospital, Hubli, Karnataka, India

ORCID: https://orcid.org/0000-0002-8713-1729

[2]Senior Resident, FNB Spine Fellow, Department of Orthopaedics, St John's Medical College Hospital, Bengaluru, Karnataka, India

Email ID: sameer.ahmed999@gmail.com, ORCiD: https://orcid.org/0009-0003-6365-8387

[3]Senior Resident, Department of Orthopaedics, Karnataka Institute of Medical Sciences, Hubli, Karnataka, India

Email ID: rajeshnaik595@gmail.com, ORCiD: https://orcid.org/0009-0002-0177-3972

[*]**Corresponding author:**

Dr Rakesh Patil

Email ID: rakeshypatil1@gmail.com

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ABSTRACT

Background: Neonatal femur fractures are rare injuries, resulting from complicated labour including instrumental deliveries and breech presentation. These fractures are reason for parental anxiety and clinical concern. Early recognition and appropriate conservative management have a excellent outcome.

Objectives: To evaluate functional outcome, Radiological union, of neonatal femoral fracture sustained during complicated labour and managed conservatively.

Methods: This prospective observational study includes 10 neonates diagnosed with isolated femoral shaft fractures associated with complicated deliveries such as breech presentation, forceps or vacuum assisted delivery. All patient was treated conservatively using compression bandage. Clinical and radiological assessment were performed at presentation, 1, 3, 6 and 12-month post treatment. Functional outcome was assessed based on limb length discrepancy, range of motion, fracture union time and complications.

Results: The mean gestation age was 38 weeks, and the mean birth weight was 3kg, All the patient were treated with compression bandage. Radiological union was achieved in all patient within 3-4 weeks. At one year follow-up all the patient demonstrated excellent outcome. No cases of non-union, neurovascular compromise and limb length shortening was observed.

Conclusions: Neonatal femoral fractures related to complicated delivery can be effectively managed by conservative management resulting in excellent outcome. Early diagnosis, appropriate immobilisation and follow up are essential for optimal recovery.

Keywords: *Neonatal femur fracture, Complicated labour, Immobilisation, Compression bandage, Perinatal orthopaedic injury.*

1. INTRODUCTION

Less than 1% of live births result in birth injuries, which are rare and frequently associated with challenging labour and breech presentations. Even less common are long bone fractures in the lower limbs, such as femur fractures, which typically happen during assisted vaginal births. Planned cesarean sections can reduce, but not completely eliminate, the risk of such fractures [1]. Despite their rarity, femoral fractures are one of the more frequent lower extremity injuries observed in newborns, particularly following breech deliveries.

An example includes a low-birth-weight female neonate delivered by C-section in breech position who presented with a femoral shaft fracture, which was effectively managed with a compression bandage immobilisation for six weeks [2]. While cesarean sections lower the risk of traumatic complications compared to vaginal deliveries, they do not entirely prevent the occurrence of birth-related injuries.

2. MATERIALS AND METHODS

Study design: Prospective Study.

Study period: April 2022 to March 2025

Place of study: KLE Jagadguru Gangadhar Mahaswamigalu Moorsavirmath Medical College and Hospital, Hubli

Sample size: 10 cases.

Inclusion criteria:

1. Neonate diagnosed as isolated femoral shaft fracture radiologically
2. History of complicated Labour e.g.: Instrumental delivery, Breech Presentation
3. Fracture treated with conservative management
4. Parents willing to participate and comply with follow up protocols

Exclusion criteria:

1. Neonates with multiply fractures with metabolic bone diseases
2. Associated with congenital musculoskeletal anomalies like Osteogenesis Imperfecta
3. Severe comorbidities impacting bone healing

Index Case:

Here we present a Index case which was monitored from early pregnancy, with initial scans showing no abnormalities. At 32 weeks of gestation, the mother developed Diabetes, which was managed by dietary modification, inj Insulin, and regular monitoring. The clinical profile and laboratory results remained within normal limits. At 38 weeks the mother was admitted for a scheduled lower segment cesarean section due to her diabetes and breech presentation. The cesarean was performed smoothly without complications During delivery of the male baby the obstetrician noted a sudden resistance and a faint crackling sound when handling the right leg. The infant cried immediately after birth, had APGAR score within normal range, and weighted 3000g. However, swelling was observed on the right thigh. On physical examination the newborn exhibited a swollen right thigh, decreased movement and discomfort on touch. The baby was transferred to Neonatal care unit for further evaluation. Xray confirmed a diaphyseal femur fracture not involving a growth plate. The infant received supportive care, feedings, and analgesics. After obtaining an orthopaedic referral, a cautious 6-week regimen involving compression bandage management was advised for the neonate. After the mother received training in applying and adjusting the bandage and in caring for the infant, the newborn was sent home on the third day. Weekly follow-ups were conducted with the newborn at the outpatient paediatric and orthopaedic departments. At day 21, callus development became apparent. At the time of the most recent follow-up, the fracture site had fully consolidated, and there was no rotational deformity or disparity in limb length.

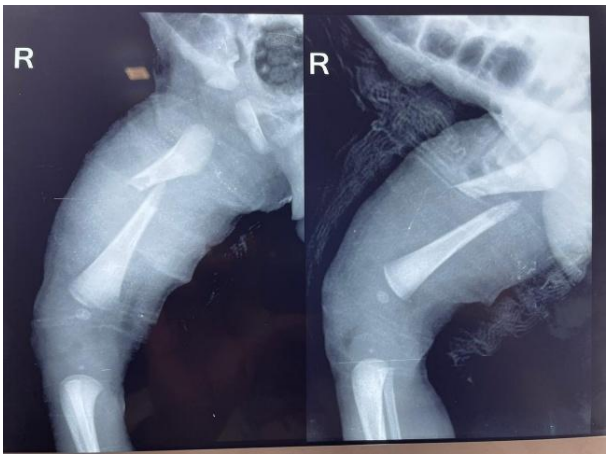

Image1: Xray of Neonate with Isolated femur fracture at presentation

Image 2 : Compression Bandage application to Immobilize the fracture

Image 3: Xray of Neonate with Isolated femur fracture at 2 weeks

Image 4: Xray of Neonate with Isolated femur fracture at 1 month.

Image 5: Xray of Neonate with Isolated femur fracture at 6 month

Image 6: No limb length discripency noted at 6 months of age

Image 7: Xray of child with Isolated femur Fracture at 2 years.

Patient No	Gender	Birth weight (kg)	Gestational Age (weeks)	Mode of Delivery
1	Male	3.0	38	Forceps
2	Female	2.8	37	Breech Vaginal
3	Male	3.2	39	Vacuum extraction
4	Female	2.7	36	Forceps
5	Male	3.1	38	Vacuum extraction
6	Male	2.9	37	Breech Vaginal
7	Male	2.6	40	Vacuum extraction
8	Female	3.4	36	Breech Vaginal
9	Female	2.6	38	Forceps
10	Male	3.3	39	Forceps

Table.1: Demographic details of Neonates

Patient No	Time to Radiological Union (weeks)	Callus formation observed	Malalignment on Follow up
1	3	Yes	No
2	4	Yes	No
3	3	Yes	No
4	4	Yes	Mild Angulation
5	3	Yes	No
6	3	Yes	No
7	5	Yes	No
8	4	Yes	No
9	3	Yes	Mild Angulation
10	3	Yes	No

Table.2 Radiological Union Assessment

Complication	No of Neonates	Percentage (%)
Skin irritation	1	10
Transient foot edema	1	10
Mild Malalignment	2	20
Limb length discrepancy (>5mm)	0	0
Neurovascular compromise	0	0

Table.3: Complications

3. RESULTS

- A total of 10 neonates with isolated femoral fracture were included in the studies.
- The sample size includes 6males and 4 females with birth weight ranging from 2.6 kg to 3.4kg.
- Gestational age varies between 36 to 40 weeks with mean gestation age of 37.8 weeks. Regarding the mode of delivery.
- 4 neonates (40%) sustained fractured during forceps assisted delivery, 3 (30%) during vacuum extraction and 3 (30%) during breech vaginal delivery.
- Radiological union was observed in all cases, with union time ranging from 3 to 5 weeks.
- Mild malalignment was noted in 2 neonates and no cases of neurovascular compromise or limb length discrepancy exceeding 5mm.
- Complications were minimal, skin irritation noted in 1 neonate and transient foot edema was reported in 1 neonate both resolving spontaneously without further intervention

4. DISCUSSION

Neonatal femoral shaft fractures account for 1-2 per 1000 live births. It is most commonly due to rotational and tractional forces applied during maneuvers for shoulder or breech dystocia. Excessive longitudinal traction on the leg can fracture the diaphysis. The findings are swelling, tenderness, crepitus, and pseudoparalysis [3]. May be initially mistaken for brachial plexus injury. Differential diagnosis includes child abuse, pathological fracture due to osteogenesis imperfecta, rickets, congenital syphilis [4].

Infants typically have stable femoral shaft fractures due to the thickness of their periosteum. Evaluation for underlying metabolic bone abnormalities or abuse should be part of the care of infant fractures [5]. After ruling these out, the majority of infants with proximal or midshaft femoral fractures are safely and comfortably treated with a Pavlik harness or other immobilisation technique to enhance the fracture healing.

Parents must be counselled about benign nature of the fracture, rapid healing and low risk for long term complication [6]. The preventive strategies include careful obstetrics technique during complicated delivery. Adequate perinatal assessment and anticipation of difficult extraction [7].

Age	Treatments
Infants (Up to 1 year)	• Pavlik harness • Early spica casting • Immobilisation with compression bandage
24 months to 5 years	• Early spica casting

	• Traction with spica cast
6 – 11 years	• Flexible intramedullary nails • Submuscular plate • External fixation
12 years to maturity	• Trochanteric entry intramedullary rod • Flexible intramedullary nail • Submuscular plate • External fixation

Table 4: Treatment Options for Isolated Femoral Shaft Fractures in Children and Adolescents

	Varus/ valgus (degrees)	**Anterior/Posterior (degrees)**	**Shortening (mm)**
Birth to 2 years	30	30	15
2 – 5 years	15	20	20
6 – 10 years	10	15	15
11 years to maturity	5	10	10

Table 5: Acceptable Angulation

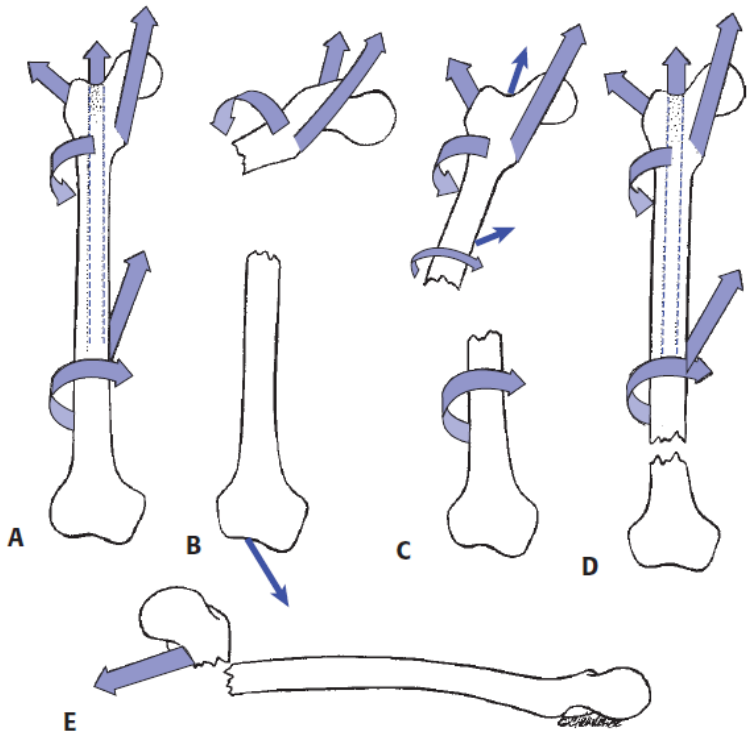

Image 8: The relationship of fracture level and position of the proximal fragment. **A**: In the resting unfractured state, the

position of the femur is relatively neutral because of balanced muscle pull. **B**: In proximal shaft fractures the proximal fragment assumes a position of flexion (iliopsoas), abduction (abductor muscle group), and lateral rotation (short external rotators). **C:** In midshaft fractures the effect is less extreme because there is compensation by the adductors and extensor attachments on the proximal fragment. **D**: Distal shaft fractures produce little alteration in the proximal fragment position because most muscles are attached to the same fragment, providing balance. **E**: Supracondylar fractures often assume a position of hyperextension of the distal fragment because of the pull of the gastrocnemius.

5. CONCLUSION

Neonatal femur fracture associated with complicated deliveries such as breech presentation, vacuum and forceps assisted deliveries can be affectively treated conservatively with excellent outcome [8]. Appropriate immobilisation achieved with pavlik harness or compression bandage allows to stabilize the fracture and rapidly unite and remodel due to its robust periosteal activity in neonates [9].

Early recognition, appropriate immobilisation, vigilant follow up and parental support, neonatal femur fracture have an excellent prognosis without residual deformity and functional impairment [10].

Conflict of Interest:

The author declares no conflict of interest.

Ethical Approval:

Approved

Consent Form:

Written informed consent was taken from the patient.

Financial Support:

Not available

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