Treatment of Femoral Fractures in Neonates

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Abstract

Background: Fractures of the femur in neonates are relatively uncommon. The infants feel pain and discomfort, causing parental distress, and the hospital stay is longer. Treatment of this specific fracture is problematic because of the small size of the baby.

Objectives: To review the results of the treatment of neonatal femoral fractures.

Methods: We retrospectively reviewed all neonatal fractures of the femur during a 12 year period. Thirteen fractures of the femur in 11 babies were treated with improvised Bryant skin traction of both legs. All the patients were reexamined after a mean follow-up period of 5.2 years.

Results: All fractures healed satisfactorily clinically and radiographically, with no residual deformity, leg length discrepancy or functional impairment.

Conclusions: Bryant's traction for 2–3 weeks in hospital is a safe method for the treatment of femoral fractures in neonates, and the outcome is good.

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Birth-related injuries to babies are relatively uncommon, with a reported incidence of less than 1% of live births [1]. Trauma to long bones in the newborn could occur during a difficult delivery, particularly when the baby is especially large or in breech presentation [2]. Fractures of the femoral shaft in newborns pose a difficult challenge to the orthopedic surgeon. Immobilization of the fractured limb should allow access to the babies' torsos and limbs for necessary medical treatment, while preventing displacement and pain as much as possible. We report our technique of treating fractures of the femoral shaft in neonates and preterm infants.

Patients and Methods

During the 12 year period 1 January 1991 to 31 December 2002, 13 femoral fractures occurred in 11 babies delivered at the Sheba Medical Center [Table 1]. All the fractures were treated with Bryant skin traction, of both legs, with the hips flexed to 90° [Figure 1]. The babies were kept in the nursery's regular cots. Pulleys were attached to infusion stands instead of a specialized bed frame, with 100 ml bags of normal saline serving as weights. The amount of weight was determined such that the infant's buttocks would be elevated 1 cm from the cot, and usually up to 200 g were needed for each leg. The nursing staff was instructed regarding the signs of vascular compromise, and the babies were examined daily by a pediatric orthopedic surgeon for any sign of vascular compromise or skin slough. This method allowed continuous care of the babies by the regular neonatal ward nursing staff without any problem. Breastfeeding was not possible with the infants in the supine position in cots, and the mothers were encouraged to pump milk which was given to the babies.

All the babies with femoral fractures were kept in hospital until stability of the fracture was achieved. After release from traction, no further immobilization or splinting was needed. The infants were evaluated for deformity and function; physical examination was performed by one of the authors (N.S.L.) and radiographs were obtained in all the children. The parents were informed of their babies' condition.

Results

The mean birth weight of the babies was 2825 g (range 1057–3605 g) and the mean gestational age was 36 weeks (range 26–40) from conception. Eight of the 11 babies sustaining fractures were delivered by cesarean section (73%); 2 babies sustained the fracture during vaginal delivery, and one baby sustained the fracture during an intravenous line insertion in the neonatal intensive

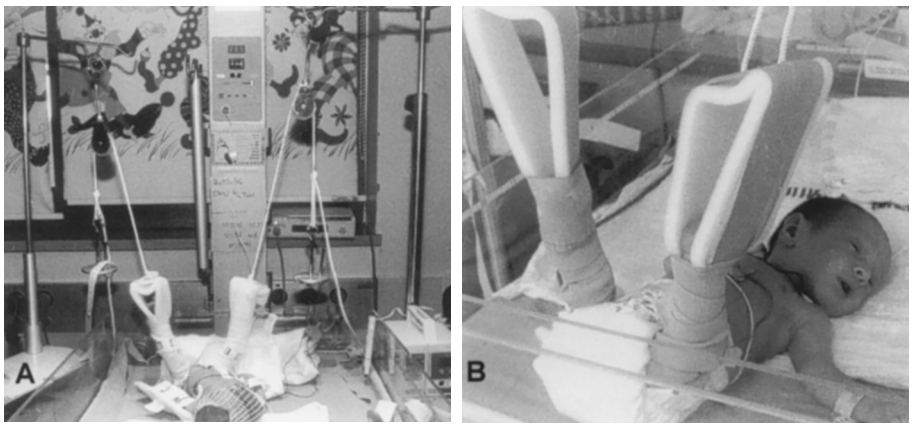

Figure 1. Baby with fractured femur in Bryant raction. **[A]** Note improvised use of infusion stands to hold traction weights. **[B]** Close-up of child with both legs in Bryant traction.

Table 1. Characteristics of neonates

No.	Gender	Gestational age (wks)	Birth weight (g)	No. of babies	Details of delivery	Bone fractured	Follow-up (mos)	Remarks
1	M	39	3605	1	CS (brow presentation)	Left femur	34	
2	F	33	2200	2	CS (first baby breech)	Right femur	79	
3	F	38	3340	1	CS (transverse)	Left femur	105	
4	M	36	3150	1	CS (unicorn uterus)	Left femur	111	
5	F	37	2880	1	CS (footling)	Right femur	84	
6	F	38	3105	1	CS (fetal distress)	Left femur	24	
7	M	40	2911	1	CS (fetal distress)	Left femur	29	
8	M	34	2290	1	CS (footling)	Right femur	44	
9	F	39	3353	1	SVD	Femur bilateral	117	
10	F	26	1057	1	SVD	Left femur	36	Fracture sustained in NICU
11	F	38	3200	1	SVD	Femur bilateral	24	

CS = cesarean section, SVD = spontaneous vaginal delivery.

care unit. Two babies were later diagnosed with genetic disorders – osteogenesis imperfecta in one and Noonan syndrome in the other. All the other children demonstrated no metabolic or genetic disorder.

All the fractures were diaphyseal and no fracture involved any of the growth plates. The average duration of traction for femoral fractures was 16.3 days. All the fractures showed clinical and radiologic healing by 3 weeks with abundant callus formation. No complications were observed during hospitalization, and there were no cases of skin breakdown under the skin traction.

The mean follow up was 5 years 2 months (range 2 years to 9 years and 9 months). No deformity, shortening or other complications were noted in the babies and children at the last follow-up.

Discussion

The recommended modes of treatment for a fractured femur in neonates include a spica cast, the Pavlic harness, and Bryant traction [1,3,4]. We treated all the babies with a modified Bryant's traction, specially adapted by us for use in a newborn's cot. The traction was applied without any specialized equipment and using simple devices available in any neonatal unit. We encountered no skin slough, no vascular compromise and no other complications using this method.

We believe that the birth of a new baby, especially a firstborn, is associated with parental distress, and when the child has a fracture this distress is increased. Most parents are concerned that they might cause the baby pain while positioning or care giving, and prefer that the baby be under the care of experienced staff. Our approach was to keep these babies as inpatients to ensure adequate food and fluid intake in the supine position and to provide daily skin care in the traction. The neonatal nursing staff encountered no difficulty in caring for the infants in traction, and the equipment did not disturb the regular work in the ward. Parents were satisfied with the treatment, and we believe that treating the infants in hospital allows the family to adjust better to the new situation rather than having the baby at home in a Pavlik harness.

Additional cost is incurred by the longer hospitalization, but we believe it is justified in order to ensure proper care of the baby. Three of the babies were kept in the NICU or neonatal ward for other problems necessitating prolonged hospitalization. Discharging a baby in a Pavlik harness or any other method of fixation requires close follow-up, involving increased expenditure for frequent outpatient clinic visits and specialized equipment.

The majority of the fractures occurred when the children were extracted during a cesarean section. The reason for this finding is not clear, and a larger survey of the total rate of fractures during cesarean section and vaginal deliveries in our hospital is currently underway with the assistance of the obstetric ward staff.

As expected, all the fractures healed without any complications or late sequelae, and none of the children demonstrated any late deformity or complications of the sustained fracture.

NICU = neonatal intensive care unit

References

1. Tachdjian MO. Obstetrical or birth injuries. Chapter 8: Fractures and dislocations. In: Tachdjian MO, ed. Pediatric Orthopedics. 2nd edn. Philadelphia: WB Saunder, 1990:3352.
2. Nadas S, Reinberg O. Obstetric fractures. *Eur J Pediatr Surg* 1992;2:165–8.
3. Stannard JP, Christensen KP, Wilkins KE. Femur fractures in infants: a new therapeutic approach. *J Pediatr Orthop* 1995;15:461–6.
4. Morris S, Cassidi N, McCormack D, McManus F. Birth associated femoral fractures. *J Pediatr Orthop* 2002;22:27–30.

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