



## Management of birth-associated subtrochanteric femur fractures

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**In daily clinical practice most orthopedic surgeons suffer from doubt about treatment of rare injuries. The aim of this study is to enlighten the management of birth related femoral subtrochanteric fractures of neonates. Four birth-related femoral subtrochanteric fractures of neonates were treated and followed up. Difficult caesarian breech delivery seems to be a risk factor. All patients were treated with Pavlik harness and union was achieved by the fourth week. None of the patients suffer any angulation or limb length discrepancy. Adequate management of this type of fractures lead to good results.**

### INTRODUCTION

Trauma-related neonatal orthopedic injuries are rarely encountered in the literature. Most of these injuries are iatrogenic in nature, including soft tissue-damaging scalpel cuts, easily recognized nerve injuries, clavicle fractures and rarely, long bone fractures. Accumulated knowledge about femoral fractures caused by child delivery is quite scarce in the literature. There are no available explanations for the risk factors, mechanisms and management of birth-associated femoral fractures. General perception of the fracture-reducing effect of caesarean surgery in comparison with normal vaginal birth is still a controversial topic (2). In this report, we aim to present our experience with birth-associated femoral subtrochanteric fractures

and question the superiority of caesarean surgery in iatrogenic injury prevention.

### METHODS

Four cases of birth-associated femoral subtrochanteric fractures diagnosed between October 2013 and July 2014 were included in the study. Three of the cases were recognized by the same attending orthopedic surgeon by consultation from the obstetrician and one was referred from another hospital for further medical care. Data were collected by the same orthopedic surgeon starting from the time of diagnosis for each case. The data consists of demographics of the neonate, type of delivery and type of fracture. Follow-ups were made in the outpatient clinic by the same attending orthopedic surgeon.

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## RESULTS

Our series of four femoral subtrochanteric fractures includes two male and two female neonates. All subjects were born at term and mean gestational age was 37.5 weeks. Mean weight was 2862.5 grams. Two of the patients were born with emergent caesarean delivery due to breech presentation and one was elective caesarian due to previous caesarian deliveries of the mother. Remaining neonate was born with vaginal breech delivery in a peripheral state hospital. Other neonates were born in fully equipped obstetric clinics. All fractures were in subtrochanteric region and three of the fractures were on the right leg. None of the neonates had any additional injuries related to delivery or any other diagnosed illness. None of the mothers were diabetic or had a related disease such as osteogenesis imperfecta. All mothers were under the age of 30. Two mothers were experiencing their first deliveries while one was having her fifth caesarean delivery. Except for the elective caesarian delivery of that mother, all other deliveries were breech position (Table I).

These four cases of femoral subtrochanteric fractures in neonates were treated with Pavlik Harness (Figures 1-3). Patients were followed at our outpatient clinic every other week for six weeks and then every third month (Figures 2-3-4). Mean follow up was 11.25 months (range: 6 to 18 months). One of the cases was lost from follow-up before the age of one year. Every neonate had callus formation seen at the control X-ray by the second week (Figure 2). Treatment continued for 4 to 6 weeks. By the age

of one year, there was no limb length discrepancy or residual significant angulations of femur on control X-rays of the three cases (Figure 5).

## DISCUSSION

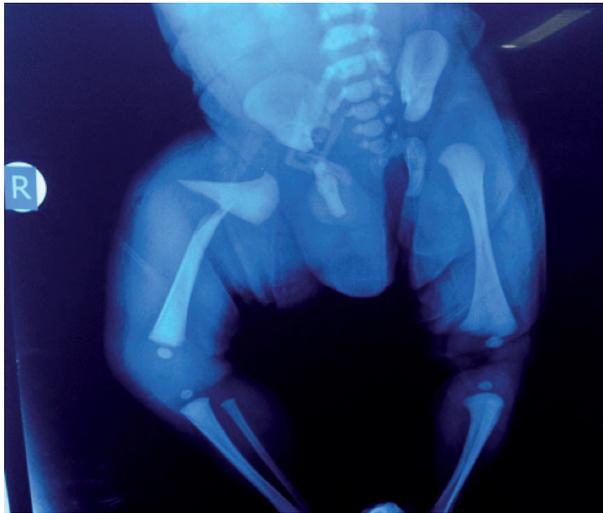
Obstetrics and orthopedics clinicians are familiar with birth-related fractures of clavicle with an incidence rate of 1.11% (3). Its mechanism and high incidence rate are understandable due to nature of vaginal birth. Yet, long bone fractures are rarely observed. Basha et al reports a 0.023% incidence rate for long bone fractures during delivery (1).



*Fig. 1.* — Pavlik Harness

Table I — Demographics of the subjects, types of fractures and treatment

	Gender of neonate	Birth weight	Gestational age (weeks)	Time to diagnose (days)	Type of delivery	Position	Fractured leg	Type of fracture	Treatment
1	Male	2600	37	1	Caesarean	Breech	Right	Subtrochanteric	Pavlic harness
2	Female	2900	36	1	Caesarean	Breech	Right	Subtrochanteric	Pavlic harness
3	Male	2750	38	1	Caesarean - elective	Cephalic	Right	Subtrochanteric	Pavlic harness
4	Female	3200	39	3	Vaginal	Breech	Left	Subtrochanteric	Pavlic harness



*Fig. 2.* — Right femoral subtrochanteric fracture of a neonate due to trauma during caesarean delivery.



*Fig. 3.* — Control X-ray of Pavlik harness applied to a femoral subtrochanteric fracture in a neonate.



*Fig. 4.* — Control X-ray at the second week of follow-up.



*Fig. 5.* — Control X-ray at 12 months of age.

Femur fractures make up for 0.017% in this rate. Incidence rate of delivery-related femoral fractures varies between 0.0077% and 0.013% in the literature (5,7). Most of these fractures are femoral shaft fractures due to the nature of the injury. Only 2 of the 10 cases in the small series by Kancherla et al are subtrochanteric fractures (4). Our small series of four subtrochanteric fractures is therefore significant and adds to the limited data available on this specific type of injury.

Breech presentation, twin pregnancies, prematurity and diffuse osteoporosis increase the risk of femoral fractures during birth (5). Authors hypothesize that caesarean delivery should reduce the risk of fractures (7). On the contrary, emergent breech caesarean delivery might have an augmented mechanical effect on birth-associated femoral subtrochanteric fractures. Mechanically, stacked limb on the level of hip and opposing force applied upwards through the incision probably trigger the

injury. The fractures of the three neonates born with caesarean delivery were on the right leg. On the other hand, the remaining neonate born with vaginal breech delivery presented with fracture on the other leg, triggered by the corresponding mechanical forces applied on the stacked limb. Attending obstetricians of the cases emphasize that during these caesarian deliveries they rushed to avoid possible complications due to hemorrhage and ischemia and there was lack of relaxation and intrauterine space for maneuver. These risk factors were stated previously in literature (6).

Due to the small number of cases in our report, available data is limited. Therefore, we could not infer any significant association between the injury pattern and demographics data. Except for the one multiparous mother, no additional risk factors were present.

Multiple treatment methods are available for subtrochanteric fractures of neonates. Subtrochanteric fractures have a tendency for flexion, abduction and external rotation. Spica casting, stripping, Bryant skin traction and Pavlik harness are possible options for treatment. Our choice of treatment was Pavlik harness. Pavlik harness establishes reduction and keeps the leg within a relatively stable position.

In contrast to spica cast, Pavlik harness is lighter and diaper management is easier. Some surgeons might prefer surgical room conditions in order to cast application with c-arm under anesthesia. Bryant skin traction method needs a long hospitalization which causes increased expenses. We must also take

into account that the mother has to be hospitalized for the new born breast feeding.

## CONCLUSION

Birth-associated subtrochanteric fractures of femur are extremely rare and are mostly related to breech caesarian delivery. Use of Pavlik harness is a proper treatment and leads to good results.

## REFERENCES

1. **Basha A, Amarin Z, Abu-Hassan F.** Birth-associated long-bone fractures. *Int J Gynaecol Obstet* 2013 ; 123(2) : 127-30.
2. **Curran JS.** Birth associated injury. *Clin Perinatol* 1981 ; 8 : 111-129.
3. **Hsu TY, Hung FC, Lu YJ, Ou CY.** Neonatal clavicular fracture: Clinical analysis of incidence, predisposing factors, diagnosis, and outcome. *Am J Perinatol.* 2002 ; 19(1) : 17-21.
4. **Kancherla R, Sankineai S, Naranje S.** Birth-related femoral fracture in newborns : risk factors and management. *J Child Orthop* 2012 ; 6 : 177-180.
5. **Morris S, Cassidy N, Stephens M, McCormack D, McManus F.** Birth associated femoral fractures: incidence and outcome. *J Pediatr Orthop* 2002 ; 22(1) : 27-30.
6. **Rijal L, Ansari T, Trikha V, Yadhav CS.** Birth injuries in caesarian sections: cases of fracture femur and humerus following caesarian section. *Nepal Med Coll J* 2009 ; 11(3) : 207-208.
7. **Toker A, Perry ZH, Cohen E, Krymko H.** Cesarean section and the risk of fractured femur. *IMAJ* 2009 ; 11 : 416-418.