Arch Gynecol Obstet (2008) 278:195–197
DOI 10.1007/s00404-008-0655-y

LETTER TO THE EDITOR

Femur fracture during abdominal breech delivery

Shigeki Matsubara · Akio Izumi · Takashi Nagai · Ichiro Kikkawa · Mitsuaki Suzuki

Received: 20 February 2008 / Accepted: 8 April 2008 / Published online: 22 April 2008

Abstract
Background While vaginal breech delivery, although rare, can cause femur fracture, abdominal breech delivery is not expected to cause it.
Case A 2,490-g female infant was delivered at term by elective cesarean section for breech presentation. She sustained a fracture of the femur shaft. A simple splinting led to a complete healing of the fracture without sequelae.
Conclusion Although abdominal breech delivery reduces the risk of birth trauma, we must be aware that femur fracture can occur regardless of the mode of delivery.

Keywords Breech presentation · Cesarean section · Femur fracture

Sirs,

Femur fracture is an important birth injury. While vaginal breech delivery, although rare, can cause femur fracture, abdominal breech delivery is not expected to cause it, and only a few reports have described it [1–7]. Here, we report a newborn suffering a femur fracture during abdominal breech delivery. This case increases the awareness of this problem.

A 2,490-g female infant was delivered at 38 1/7 weeks of gestation by elective cesarean section for breech presentation in a 37-year-old, primiparous woman. She had no history of previous uterine surgery. Combined spinal and epidural anesthesia was performed with adequate analgesia and muscle relaxation. An incision was made in the lower segment as usual, and the infant's buttocks and iliac crest lay beneath the incision site. The infant was in a frank breech presentation. Extraction was attempted by locking the index finger in the groin on both sides and exerting traction as usual. We did not use the Pinard maneuver; we did not pull out the thigh. Although traction was a little difficult, possibly due to a tight uterine incision, the buttocks and lower extremities were pulled out without employing further maneuvers, with the thighs being pressed against the fetal abdomen. Just at the moment of delivering the buttocks and the thighs from the incision, a "crack" was heard, which a nurse recalled later. A female infant weighing 2,490 g with 1- and 5-min Apgar score of nine and nine, respectively, was delivered. Routine examination soon after delivery revealed no abnormalities. We did not pay special attention to the thigh at that time. The next day, the right thigh showed slight swelling with decreased mobility compared to the left. These signs, together with the suggestion from a nurse recalling the "crack", led us to perform a radiographic examination, which revealed a fracture in the femur shaft with the proximal portion displaced anteriorly (Fig. 1a). Bone structure and bone mineralization appeared normal. We found no other bone fractures/deformities or blue sclera, signs for osteogenesis imperfecta. We also found no hypotonia, a sign for Weldnig-Hofmann disease, which was reported to induce disused atrophy of the bones and thus pathological long bone fracture in newborns [8]. A simple splinting was applied. Radiograph on day 13 after birth revealed callus formation at the fracture site (Fig. 1b). On day 20, the callus appeared more evident (Fig. 1c) and the cast was removed. On day 23, she actively moved her

S. Matsubara (✉) · A. Izumi · T. Nagai · M. Suzuki
Department of Obstetrics and Gynecology,
Jichi Medical University, 3311-1 Shimotsuke,
Tochigi 329-0498, Japan
e-mail: matsushi@jichi.ac.jp

I. Kikkawa
Department of Pediatric Orthopedics,
Jichi Medical University, Tochigi, Japan

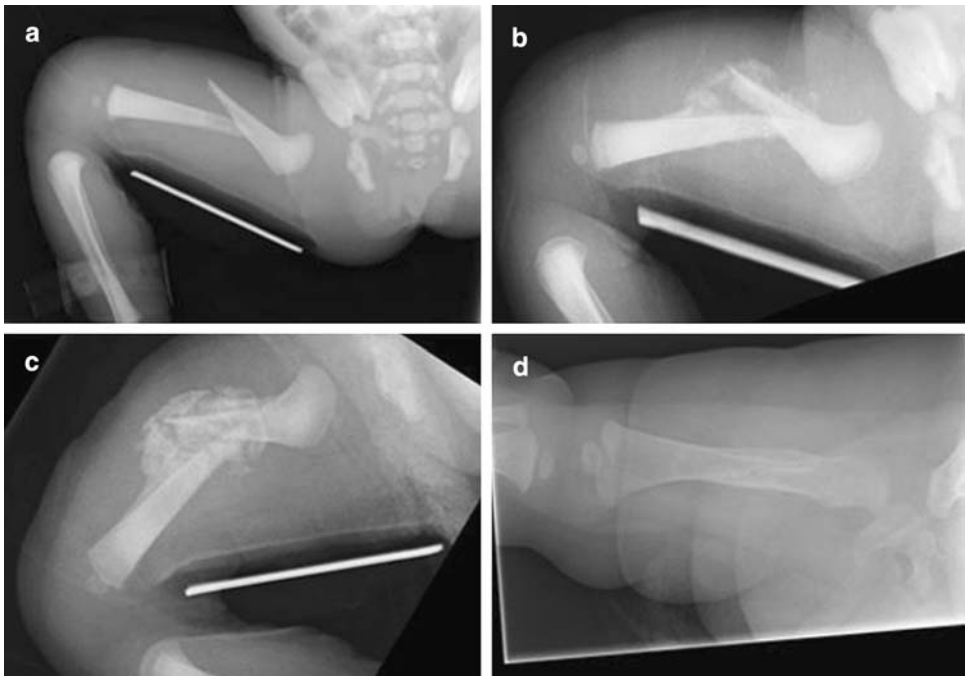

Fig. 1 X-rays of right femur of the newborn. Right femur shaft is fractured, with the proximal portion displaced anteriorly (**a**, day 1 after birth). Callus, although weak, can be observed at the fracture site (**b**, day 13), becoming more evident (**c**, day 20), and finally healing of the fracture is observed (**d**, day 75)

right leg and was discharged. On day 75, the fracture almost completely healed (Fig. 1d). At 20 weeks after birth, at the time of writing, the legs showed an appropriate range of movement without length discrepancy.

Only five English language reports, to our knowledge, have provided data regarding six singleton newborns with femur shaft fracture during abdominal breech delivery; we added one more. This case suggested two important clinical issues.

First, we must be aware of the possibility, though quite low, of femur fracture during breech abdominal delivery. A randomized multicenter trial by Hannah et al. [9] indicated that long born fracture occurred in 0.1% (1/1041) and 0.5% (5/1042) from abdominal and vaginal breech deliveries, respectively; planned cesarean section reduced the risk of long bone fracture, but it may not reduce femur fracture to zero. Table 1 summarizes the clinical features of seven singleton cases of femur shaft fracture during abdominal breech delivery. Difficult extraction, and thus femur fracture, has been considered to be induced by several factors; heavy infant weight [1, 2], twin pregnancy [6], the presence of myoma [1], and inadequate uterine relaxation [5], although its reason was not specified in the present case. Heavy weight does not appear to be a culprit; all seven injuries occurred in newborns of average weight (median 3,220 g, range 2,490–3,700 g). Four cases had a difficult extraction; one due to an impacted foot in the pelvis (Case 3 [5]), and another due to previous uterine surgery leading to a tight uterine incision (Case 4 [5]). Three women were in labor and underwent emergency cesarean section (Case 1 [3], 3 [5], and 4 [5]); the breech-presenting part may be well engaged in the pelvis, and thus strong extraction may be needed. A scarcity of data prohibits us from proposing a suitable maneuver to avoid femur fracture. However, taking all data [1–7] into consideration, adequate analgesia, gentle traction, and a uterine incision large enough for easy extraction may be important to avoid the injury. If more space is needed, we should not hesitate to incise more instead of continuing with a difficult traction. In the present case, although we are unable to specify the reason for the injury, we actually had slight difficulty in the traction; thus, we should have incised more at that time. All six infants, including this patient, showed complete healing without sequelae only with a cast or a splint.

Second, a “crack” may be an important clinical sign for the early detection of femur fracture, which was observed in four cases, including the present case. Different from the expectations, some cases (Cases 5 [6] and the present case) did not show marked swelling at the site on the day of delivery. We employed an ordinary maneuver except for having had a little difficulty in extraction, and thus we did not at first suspect a femur fracture; however, one nurse recalled the “crack”, recommending us to perform a radiological examination, and revealing the fracture the day after birth. This agrees well with previous observations by Morris et al. [6]; no evidence of a femoral injury was noted on the immediate postnatal examination, and a mean of 6.3 days (range 1–21) was required for diagnosis. It may be important for the early detection of femur fracture to pay attention to a “crack”.

We must admit that in the present case, although we employed ordinary procedure for breech abdominal delivery,

Table 1 Clinical features of cases with femur fracture during abdominal breech delivery

Infant	Weeks at *C/S*	Age/parity	Labor[a]	Difficult extraction	Crack[b]	Diagnosis made (days)[c]	Reference
1	42	21/prim.	Yes	Yes	Yes	1	Barnes et al. [3]
2	nm	22/prim.	No	No	nm	nm	Vasa et al. [4]
3	39	37/mult.	Yes	Yes	Yes	nm	Awwad [5]
4	38	27/prim.	Yes	Yes	Yes	nm	Awwad [5]
5	40	nm/mult.	No	nm	nm	10	Morris et al. [6]
6	39	25/prim.	No	No	nm	2	Cebesoy et al. [7]
7	38	37/prim.	No	Yes	Yes	2	This study

C/S cesarean section, *prim*. primipara, *mult*. multipara, *nm* not mentioned

[a] Labor, yes: cesarean section was done after labor initiation

[b] Crack: a crack was heard during extraction

[c] Days: days after birth when radiological examination was done

All seven cases showed no clinical signs of systemic diseases including osteogenesis imperfecta, Werdnig-Hofmann disease, etc., which may induce pathological bone fractures in newborns. Although additional three cases [1, 2], other than these seven, were reported, they were cited only in a preliminary form and provided insufficient data; thus, they are excluded from this table

we should have incised the uterus more, and should have paid more attention to the "crack" during the surgery. Femur shaft fracture can occur in abdominal breech delivery. Recently, femur epiphyseal [10] or metaphyseal [11] fractures were also reported to occur in infants delivered by elective cesarean section for breech presentation. Clinicians must be aware that abdominal delivery does not preclude the occurrence of femur fracture.

References

1. Ehrenfest H (1922) Birth injuries of the child. Appleton-Century Crofts, New York
2. Kellner KR (1962) Neonatal fracture and cesarean section. (Letter) Am J Dis Child 136:865
3. Barnes AD, Van Geem TA (1985) Fractured femur of the newborn at cesarean section, a case report. J Reprod Med 30:203–205
4. Vasa R, Kim MR (1990) Fracture of the femur at cesarean section: case report and review of literature. Am J Perinatol 7:46–48
5. Awwad JT (1993) Femur fracture during cesarean breech delivery. (Letter) Int J Gynecol Obstet 43:324–326
6. Morris S, Cassidy N, Stephens M, McCormack D, McManus F (2002) Birth-associated femoral fractures: incidence and outcome. J Pediatr Orthop 22:27–30
7. Cebesoy FB, Cebesoy O, Incebiyik A (2008) Bilateral femur fracture in a newborn: an extreme complication of cesarean delivery. Arch Gynecol Obstet. Epub ahead of printing. doi:10.1007/s00404-008-0639-y
8. Burke SW, Jameson VP, Roberts JM, Johnston CE, Willis J (1986) Birth fractures in spinal muscular atrophy. J Pediatr Orthop 6:34–36
9. Hannah ME, Hannah WJ, Hewson SA, Hodnett ED, Saigal S, Willian AR (2000) Planned caesarean section versus planned vaginal birth for breech presentation at term: a randamised multicentre trial. Lancet 356:1375–1383
10. Jain R, Bielski RJ (2001) Fracture of lower femoral epiphysis in an infant at birth: a rare obstetrical injury. J Perinatol 21:550–552
11. O'Connell AM, Donoghue VB (2007) Can classic metaphyseal lesions follow uncomplicated cesarean section? Pediatr Radiol 37:488–491