Forensic pediatric radiology: studies in living and deceased children
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Chapter 8

Classic metaphyseal lesion following vaginal breech birth: a rare birth trauma

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ABSTRACT
A six day old male neonate, born after attempted external version (ECV) and vaginal breech birth, was evaluated for pain during diaper changes. US of the leg showed a small subperiosteal fluid collection at the distal right femur. Conventional radiographs demonstrated the presence of a classic metaphyseal corner fracture (CML). This case is, to our knowledge, the first to report a CML after ECV and vaginal delivery.
INTRODUCTION
The finding of a classic metaphyseal lesion (CML) in a young child is generally considered to be highly specific for child abuse.\(^1\) However, like in any radiological finding a differential diagnosis exists. In neonates birth trauma is one of the causes of fractures that should be considered. A Dutch analysis, between 1997 and 2004, among 158,035 full-term neonates showed an overall fracture incidence of 0.74%, that was not otherwise specified.\(^2\) It is a well-known fact that, although the incidence is low, long bone fractures are associated with breech and forceps delivery.\(^3\) In the Term Breech Trial it was shown that there was a 0.1% incidence of long bone/clavicular fractures in the caesarean birth group compared to 0.6% in the vaginal delivery group.\(^4\) Several cases of CML following CS have been reported in literature.\(^5\)–\(^8\) However, to date no cases have been reported following vaginal delivery. In this case report we present an otherwise healthy neonate with a CML after breech vaginal delivery.

CASE REPORT
A term male neonate (40 week gestational age) was born to a 38 year old primigravid. Pregnancy was uncomplicated except for breech position. After an unsuccessful external cephalic version (ECV) the parents, after counselling, opted for vaginal delivery. At 39 4/7 week gestational age rupture of membranes occurred without signs of impeding labour, after 24 hour labour was induced using misoprostol. Three days thereafter oxytocin was started and epidural anesthesia was administered. During cervical dilation a deceleration on the cardiotocogram was noted and subsequently an assisted breech delivery was performed. This procedure was complicated by prolonged development of the arms, taking approximately two minutes. After the baby was born, with a birth weight of 3750 gram was pale, showed bradycardia and no spontaneous breathing, the APGAR scores were 1/3/5.

Figure 1a. Transverse ultrasonography image of the right distal femur showing a small subperiosteal fluid collection (arrow). Figure 1b. Transverse ultrasonography image of the left distal femur showing no abnormal findings.
He was subsequently admitted to the neonatal intensive care unit (NICU). At the NICU the nurses noted that during diaper changing he was irritable and kept crying. Due to the fact that these complaints remained, on day six of life, an ultrasound study of the right leg to assess the hip was performed. This US exam showed a normal aspect of the hip, but upon further evaluation of the right leg a subperiosteal fluid collection, with signs of some callus formation, at the level of the distal femoral diaphysis was noted (Fig. 1a, b). Under the differential diagnosis of osteomyelitis or a fracture, additional conventional radiography was obtained which showed a CML (Fig. 2a, b). As the baby had been in the care of the NICU, the complaints were noted after birth and the fact that there was no concern at all for child abuse no further radiological imaging was performed. On follow-up outpatient clinic visit the baby showed a normal development.

**DISCUSSION**

In case of a fracture in an infant, it is important to differentiate between a birth trauma or trauma after birth, may it be accidental or non-accidental. Given the strong relation between CML and child abuse this is especially of importance in potential legal proceedings. It is therefore extremely important that a complete clinical and obstetrical history is obtained, as it is well-known that fractures can occur as a result of birth trauma.

This case is to our knowledge the first to report a CML after ECV and vaginal delivery. Several cases of CML following caesarean section (CS), both with and without ECV, have been reported (Table 1). Additionally several case reports of epiphyseal separation fractures (ESF) of the distal femur, as a birth trauma have been reported (only English, French and German literature is included, Table 1). These fractures, which can be classified as Salter-Harris type I and II fractures, have reportedly a similar causative mechanism, i.e.
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Shearing and torsion forces exerted on the affected long bone and are therefore included in Table 1. Given the policy of many medical journals not to publish case reports or only extremely rare cases and the lack of clinical findings, we feel that it is more than likely that the incidence of CML as a result of birth trauma is more common than the reported rate of 0.0016% (calculation based on paper by O'Connell & Donoghue). Furthermore, it is thought that most CML will not produce complaints, this implies that cases will not be noticed directly after birth and in the persisting absence of clinical findings might remain undiagnosed. In existing literature CML is described as a result of caesarean section, irrespective of the fact whether a previous ECV was attempted or not. One case of distal femoral ESF following vaginal delivery has been described in literature. However, this case was diagnosed at three months of age and no specific details, apart from a difficult birth, are provided. Given the absence of relevant clinical information and imaging following birth, it cannot be excluded that this case is not birth related but the result of trauma, e.g. non-accidental injury, suffered later in life. Based on the literature findings we hypothesise that the CML in our case most likely occurred as result of breech delivery and not from ECV.

From a forensic perspective the importance of this case report lies in the fact that if a case of CML is encountered in a new-born, birth trauma – even if after vaginal delivery – is a possible, albeit extremely rare, aetiology. Birth injury, of course, must be considered in context of all findings, such as the absence of additional injuries suggestive of abuse and a consistent history of difficult delivery.

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</table>

* Diagnosed at age of three months. The authors state that there was a difficult delivery. Given the time between birth and diagnosis other causes, including child abuse, cannot be ruled out.

CML: Classic metaphyseal lesion; CS: Caesarean section; EFS: Epiphyseal fracture separation; NR: Not reported
REFERENCES