



Delayed Presentation of a Humerus Shaft Fracture with Bridging Callus in the Late Neonatal Period - A Diagnostic Challenge: A Case Report

Yenidoğan Döneminin Sonlarında Köprüleme Kalluslu Humerus Şaft Kırığının Gecikmiş Sunumu - Tanısal Bir Zorluk: Bir Olgu Sunumu

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Abstract

In infants, humeral fractures are commonly caused by birth injuries, child abuse, and direct or indirect trauma. After the clavicle, the humerus is the second most common site of birth-related long bone fracture in neonates and is frequently associated with forced obstetric maneuvers in difficult vaginal or cesarean deliveries. A neonate, born to a primigravida after a difficult vaginal delivery, presented on postpartum day 16 with a painless localized firm swelling in his right mid-arm noticed for 4 days. Features of abuse, fall injury, and osteogenesis imperfecta were absent. X-rays confirmed a right mid-shaft humeral fracture with bridging callus at the fracture ends. A diagnosis of a birth-associated humeral diaphyseal fracture was made. The fracture healed completely with conservative management, without sequelae. The case highlights the diagnostic challenge associated with delayed neonatal presentation of a humeral shaft fracture with callus formation.

Keywords: Pediatric humerus fractures, birth injury, difficult vaginal delivery, child abuse, fall injuries, osteogenesis imperfecta

Öz

Bebeklerde humerus kırıkları genellikle doğum travması, çocuk istismarı ve doğrudan veya dolaylı travmaya bağlıdır. Klavikula'dan sonra humerus, yenidoğanlarda doğumla ilişkili uzun kemik kırıklarının en sık görüldüğü ikinci bölgedir ve sıklıkla zor vajinal veya sezaryen doğumlarda zorlayıcı obstetrik manevralarla ilişkilidir. Zor vajinal doğum sonrası ilk gebeliğini yaşayan bir anneden doğan yenidoğan, 4 gündür fark edilen sağ orta kolunda ağrısız, lokalize, sert bir şişlikle doğum sonrası 16. günde başvurdu. İstismar, düşme yaralanması ve osteogenezis imperfekta belirtileri yoktu. Röntgenler, kırık uçlarında köprü oluşturan kallus ile birlikte sağ humerus orta şaft kırığını doğruladı. Doğumla ilişkili humerus diyafiz kırığı tanısı konuldu. Kırık, herhangi bir sekelsiz olarak konservatif tedavi ile tamamen iyileşti. Bu olgu, kallus oluşumu ile birlikte humerus şaft kırığının geç neonatal prezentasyonunun tanısal zorluğunu vurgulamaktadır.

Anahtar Kelimeler: Pedyatrik humerus kırıkları, doğum travması, zor vajinal doğum, çocuk istismarı, düşme yaralanmaları, osteogenezis imperfekta

Introduction

The humeral diaphysis accounts for 20% or less of all pediatric humerus fractures.¹ Birth trauma during vaginal breech delivery, difficult fetal extraction, and instrumented delivery (forceps or vacuum extraction), child abuse, and falls often cause humeral fractures in infants.^{2,3} They are typically diagnosed soon after birth, on the first day of life or during the early neonatal period (between day 1 and day 7).^{4,6}

Although delayed presentation of long bone fractures in the late neonatal period (between day 8 and day 28) has been reported for the femur⁷⁻¹⁰ and distal humerus epiphyseal injury^{4,6,11} the late presentation of a diaphyseal humerus fracture with callus is rarely seen.

We report a case of a neonate, born to a primigravida after a difficult vaginal delivery, who presented on postnatal day 16 with painless swelling of the mid-portion of the right arm.

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Radiographs demonstrated a mid-shaft humeral fracture with bridging callus, posing a diagnostic dilemma. This report highlights the importance of maintaining a high index of suspicion for birth-related fractures in infants who present with unexplained limb swelling, even when the presentation is delayed. It emphasizes the need to adopt a systematic and holistic approach to differentiate birth trauma from abuse and bone fragility disorders through careful history-taking and clinico-radiological assessment.¹²

Case Report

A 15-day-old, 3.0 kg male infant, born to a primigravida, was brought to the orthopedic outpatient department (OPD) with a 4-day history of swelling in his right mid-arm. The narrative provided by his parents was as follows: the delivery was performed at a local community health center and was attended by a trained nurse. The baby cried immediately after birth. The nurse reported a difficult vaginal delivery, during which an episiotomy was performed. The parents did not notice any swelling in the baby's right arm, although they noted excessive crying since birth whenever an attempt was made to move and lift his arm passively during dressing and bathing; this crying became less frequent over time.

On day 12, the parents noticed a localized firm swelling in the child's right mid-arm. The right arm X-ray was performed, and a temporary splint was applied by a local bonesetter. On day 16, the baby was brought to the hospital's orthopedic OPD. A localized, firm-to-hard, non-tender swelling was noted in the right mid-arm, with no abnormal mobility on gentle manipulation. The capillary refill was good, with a palpable distal radial pulse. The range of motion (ROM) of the wrist, elbow, and hand was within normal limits. No wrist drop or abnormal posture of the right upper limb was observed, which ruled out a nerve injury. The other long bones, viz., the clavicle, femur, and both bones of the forearms and legs, were found to be normal. The parents denied that the child had been abused or had sustained a fall-related injury. Findings such as craniotabes, blue sclera, fractures of other long bones, multiple bony swellings, limb bowing deformities, or bruises over the body were absent on clinical examination. Radiographs demonstrated a mid-shaft humeral fracture with bridging callus. Based on a history of difficult birth and clinico-radiological findings, along with the absence of features suggestive of child abuse or fall injury, a working diagnosis of a birth-associated humeral shaft fracture was made (Figure 1).

The fracture was immobilized with a high above-elbow plaster of Paris slab for two weeks. X-rays taken after three weeks showed good alignment of the bone and an abundant callus at the fracture ends, suggesting complete union (Figure 2A-B). Follow-up at six months showed a good ROM of the

shoulder and elbow. An X-ray revealed excellent remodeling of the fracture without deformity (Figure 3).

Written informed consent was obtained from the patient's parents for the publication of this case report and accompanying X-rays. The study carried out as per the World Medical Association Declaration of Helsinki.

Discussion

Humerus fractures in children are relatively uncommon and represent 2% to 5.4% of all childhood fractures.² Apart from birth trauma, child abuse, and fall injuries, other less common causes of neonatal humeral fractures are: neonatal osteopenia (transient neonatal osteoporosis), especially



Figure 1. X-ray at 12th day after birth showing fracture mid-shaft right humerus (arrow) and bridging callus at fracture ends (asterisk)

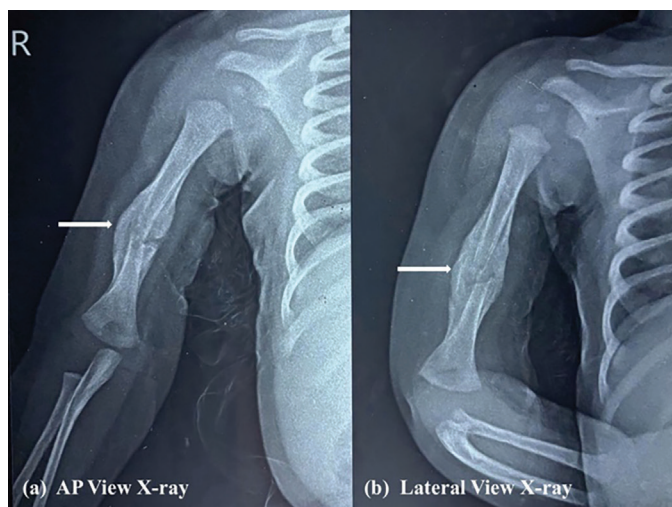


Figure 2. AP (a) and lateral (b) X-ray views of the right humerus at six weeks show abundant callus at the fracture ends, suggesting complete fracture union (arrow)

AP: Anteroposterior

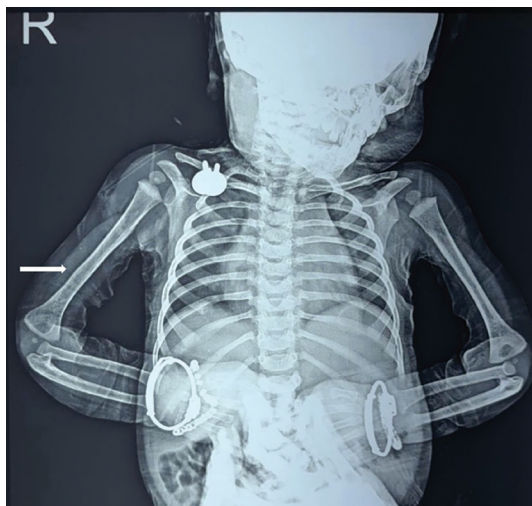


Figure 3. Follow-up X-ray after 6 months showing complete healing and excellent remodeling of the fracture mid-shaft humerus (arrow)

in preterm and low birth weight babies, bone fragility and metabolic diseases like osteogenesis imperfecta, rickets, or vitamin D deficiency, leading to secondary osteopenia and fractures.⁴ Neonates, who are diagnosed with a fracture in the first week of life, in the absence of known postnatal trauma, are considered to have a birth fracture.^{2,3,5} Humerus fracture is the second most common birth-related long bone fracture in neonates, after the femur, with a reported incidence of 0.04-0.2/1000 live births.^{3,5,6} Breech presentation, external version, difficult delivery, inadequate uterine relaxation, prematurity, and osteogenesis imperfecta are some risk factors associated with neonatal long bone fractures involving the humerus and femur shaft.^{5,12} Traction on the extended arm in breech presentation, and axillary traction to disengage an impacted shoulder, as in shoulder dystocia in cephalic presentation, can cause fracture of the humerus shaft during vaginal deliveries.¹³

Most neonatal humeral shaft fractures are transverse and occur at the mid-third level^{2,13} as in our case. Their diagnosis is usually straightforward and almost always established by plain X-rays.⁶ A history of difficult labor, a pathognomonic "click" or "snap" during obstetric maneuvers, and a characteristic clinical presentation help in diagnosing the fracture immediately after delivery, on the first day of life, or in the early neonatal period (between day 1 and day 7).^{4,5,12} Delayed presentation of long bone birth fractures in the late neonatal period has been reported for the femur and distal humerus epiphyseal injuries; however, the late presentation of a diaphyseal humerus fracture with callus in neonates is rarely seen. Al-Habdan⁷ reported a delay of 3 to 7 days in 48.0% of neonates with long bone fractures; Morris et al.⁸ reported

three neonates with delay of 7, 10, and 21 days. While Kanai et al.⁹ and Toker et al.¹⁰ diagnosed birth-associated femur fracture on postpartum days 9 and 10, respectively; Jacobsen et al.¹¹ diagnosed distal humeral epiphysis injuries between 9 and 30 days after birth in the majority of their patients.

An important differential diagnosis of humeral diaphyseal fractures in children younger than 3 years, and particularly <6 months, is child abuse.^{1,3} The presence of a "corner" or "bucket-handle fracture of the metaphysis", on radiographs is pathognomonic of child abuse.^{1,2} Other characteristic findings strongly suggestive of child abuse include the presence of fractures in the long bones and ribs with callus at different stages of healing, fracture of the scapula or the sternum,^{1,2} and patterned bruises of different ages in covered areas such as the chest, abdomen, buttocks, and lower back.¹⁴ Another common differential cause of bone fragility in neonates simulating child abuse is osteogenesis imperfecta and metabolic bone disease of prematurity.^{2,15} Osteogenesis imperfecta is characterized by the presence of abnormal type 1 collagen and defective mineralization of the bone matrix, resulting in the generation of mechanically weak bones with a propensity to fractures.¹⁵ The classical blue sclera in a neonate, with a maternal history of previous multiple miscarriages and intrauterine deaths, and a family history of recurrent fractures following minor trauma, provides an important clue to the diagnosis.¹⁵ Genetic and biochemical assays are useful to confirm the disease.²

While humeral fractures in children, particularly those <6 months old, are often linked to child abuse, fall injuries are usually associated with humerus fractures in children between 6-12 months.³ The characteristic features of bone disease in infancy, such as craniotabes, a large anterior fontanel, sutural diastasis without hydrocephalus, and frontal bossing, were absent in our case.¹⁵ In addition, the absence of a maternal history of recurrent spontaneous abortions or intrauterine deaths, the absence of blue sclera, the absence of multiple fractures in other long bones, and parental denial of abuse or fall injury, together with a history of difficult vaginal delivery with episiotomy, favour the diagnosis of a birth-related humeral fracture in this neonate.

The treatment of neonatal humerus shaft fractures is mostly non-operative and includes simple chest bandage, sling-and-swathe, von Rosen splint, U-slab, above-elbow slab or cast, and swaddling.^{1,6} Immobilization of the limb,¹² for approximately two weeks is generally sufficient.^{5,6} Despite an initially unsatisfactory appearance of fracture union on X-rays, remodeling of significant malalignment of up to 40-50% or greater can be seen within 1 to 2 years.¹

Conclusion

In conclusion, this case report describes the diagnostic dilemma that resulted from the delayed presentation of a humerus shaft fracture with bridging callus in the late neonatal period. Although birth-related trauma is a frequent cause of neonatal humeral diaphyseal fractures, the possibility of child abuse, metabolic diseases, and fall injuries must be ruled out. A proper history from the parents, a thorough clinical examination of the neonate, biochemical analysis, and radiographs are the cornerstones of diagnosis. Obstetricians must take appropriate care when applying traction to the limbs during fetal extraction in vaginal deliveries. These fractures have an excellent prognosis and heal completely with limb immobilization, without sequelae.

Ethics

Informed Consent: Written informed consent was obtained from the patient's parents for the publication of this case report and accompanying X-rays.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: R.P.F., Concept: N.A.Q., R.P.F., Design: N.A.Q., Data Collection or Processing: N.A.Q., Analysis or Interpretation: N.A.Q., Literature Search: N.A.Q., Writing: N.A.Q.

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References

1. Donald S, Bae DS. Humeral shaft and proximal humerus, shoulder dislocation. In: Flynn JM, Skaggs DL, Waters PM (eds). *Rockwood and Wilkins' fractures in children*. 8th ed. Philadelphia: Wolters Kluwer Health; 2015:784-9.
2. Caviglia H, Garrido CP, Palazzi FF, Meana NV. Pediatric fractures of the humerus. *Clin Orthop Relat Res*. 2005;432:49-56.
3. von Heideken J, Thiblin I, Högberg U. The epidemiology of infant shaft fractures of femur or humerus by incidence, birth, accidents, and other causes. *BMC Musculoskelet Disord*. 2020;21:840.
4. Carvalho M, Barreto MI, Cabral J, Balacó I, Alves C. Neonatal upper limb fractures - a narrative overview of the literature. *BMC Pediatr*. 2024;24:59.
5. Basha A, Amarin Z, Abu-Hassan F. Birth-associated long-bone fractures. *Int J Gynaecol Obstet*. 2013;123:127-30.
6. Sherr-Lurie N, Bialik GM, Ganel A, Schindler A, Givon U. Fractures of the humerus in the neonatal period. *Isr Med Assoc J*. 2011;13:363-5.
7. Al-Habdan I. Birth-related fractures of long bones. *Indian J Pediatr*. 2003;70:959-60.
8. Morris S, Cassidy N, Stephens M, McCormack D, McManus F. Birth-associated femoral fractures: incidence and outcome. *J Pediatr Orthop*. 2002;22:27-30.
9. Kanai Y, Honda Y, Honda T, Sanpei M. Delayed birth-related femur fracture after cesarean section: a case report. *AJP Rep*. 2018;8:e158-60.
10. Toker A, Perry ZH, Cohen E, Krymko H. Cesarean section and the risk of fractured femur. *Isr Med Assoc J*. 2009;11:416-8.
11. Jacobsen S, Hansson G, Nathorst-Westfelt J. Traumatic separation of the distal epiphysis of the humerus sustained at birth. *J Bone Joint Surg Br*. 2009;91:797-802.
12. Qureshi NA, Futela RP. Obstetric neonatal femur fracture during emergency cesarean section for breech: a case report. *J Orthop Case Rep*. 2025;15:11-5.
13. Curran JS. Birth-associated injury. *Clin Perinatol*. 1981;8:111-29.
14. Sultanate of Oman Ministry of Health. Clinical guidelines on child abuse and neglect [Internet]. Accessed: December 5, 2025. Available at: <https://platform.who.int/docs/default-source/mca-documents/policy-documents/operational-guidance/OMN-CH-14-09-OPERATIONALGUIDANCE-2016-eng-Clinical-Guidelines-Child-Abuse-Neglect.pdf>
15. Bishop N, Sprigg A, Dalton A. Unexplained fractures in infancy: looking for fragile bones. *Arch Dis Child*. 2007;92:251-6.