Delayed presentation of a neonatal clavicle fracture: a management challenge

Introduction

Birth injury is defined as 'an impairment of the neonate's body function or structure due to an adverse event that occurred at birth' (McKee-Garrett, 2017). A 24-year (1986–2009) retrospective Israeli study of 2874/142 500 neonates who had suffered birth trauma found that scalp injury (63.9%) and neonatal clavicle fracture (32.1%) were the most commonly reported (Linder et al, 2012). The clavicle is the most frequently fractured bone during the birthing process; the incidence varies between 0.2% and 3.5% with a slight male preponderance (Reiners et al, 2000; Linder et al, 2012; McKee-Garrett, 2017). This article describes a delayed presentation of a neonatal clavicle fracture and the associated challenges.

Discussion

This case demonstrates the need to involve relevant specialists when birthing injuries, e.g. neonatal clavicle fracture, are identified post-discharge, as child safeguarding concerns are raised. Following a review by the paediatric consultant and subsequent discussion with the radiologist about the timing of the injury and callus formation, birth injury was considered the likely explanation in this case.

Neonatal clavicle fractures are known to occur in caesarean section deliveries as well as in vaginal deliveries without any risk factors (Choi et al, 2017; McKee-Garrett, 2017). In a 12-year Korean study, neonatal clavicle fractures were recorded in 0.05% (n=19) of 36 286 caesarean section deliveries (Choi et al, 2017). *Table 1* highlights risk factors associated with neonatal clavicle fractures.

Diagnosing neonatal clavicle fractures can be challenging. Displaced fractures are more likely to be accompanied by physical findings: crepitus, oedema, lack of movement of the affected limb, asymmetrical bone contour, and discomfort or crying with passive motion (McKee-Garrett, 2017). A prospective American study by Reiners et al (2000), where 22/1661 neonates had clavicle fractures, identified the following physical findings in these neonates:

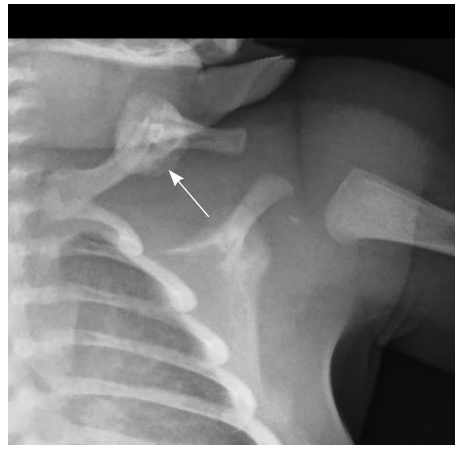
- 82% had 'palpable spongy-mass sign'
- 45% had crepitus
- 9% had angulation deformity
- 5% had localized tenderness.

A non-displaced neonatal clavicle fracture usually remains asymptomatic. Diagnosis is often delayed by days or weeks until there is palpable callus formation, presenting as a 'visible lump' (McKee-Garrett, 2017). In a retrospective 10-year Korean study by Ahn et al (2015), involving 77 543 neonates, 86.2% of neonatal clavicle fractures (275/319) were detected pre-hospital discharge. However, it may be noted that a newborn physical examination only identified 45% of cases (n=144), while the rest (55%; n=175) were identified coincidentally on chest X-rays.

Timing of radiological imaging in relation to the time of the injury is extremely important. In a retrospective study from the USA where three radiologists were shown 108 digital images of neonatal clavicle fractures (from 61 infants), the following radiological features were reported with good level of agreement: periosteal reaction (11–42 days), callus formation (12–61 days), bridging (22–63 days), remodelling (49–59 days) (Fadell et al, 2017).

Management remains largely conservative – explanation and reassurance is all that is required. For comfort, the arm on the

Figure 1. X-ray showing left clavicle fracture with callus formation (arrow).



CASE REPORT

A 21-day-old boy born at 41 weeks' gestation with a birthweight of 3.9 kg was referred by the GP with a lump over the left shoulder region. He was exclusively breastfed and thriving. On clinical assessment his temperature was 36.4°C, heart rate 154/min, respiratory rate 48/min and a hard lump was detected over the left clavicle. He was alert and playful, systemic examination was otherwise unremarkable and no bruises or injuries were identified. A provisional diagnosis of left clavicle fracture was made.

X-ray confirmed a mid-shaft neonatal clavicle fracture with angulation and significant callus formation (*Figure 1*). Following discussion with the radiology team, a healing neonatal clavicle fracture was considered to be consistent with a birth injury. The orthopaedics team agreed and did not suggest any active intervention. The child safeguarding team was contacted in view of the delayed presentation of neonatal clavicle fracture, but no concerns were identified and it was considered safe for him to be discharged.

At discharge, guidance was provided on conservative management such as gentle handling, pain relief with paracetamol, avoiding pulling the limb on the affected side while lifting the baby and not lying the baby on the affected side.

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Table 1. Risk factors for sustaining a clavicle fracture in neonates

Neonatal factors	Birth weight >4.0 kg
	Length at birth >52 cm
	Low head:chest circumference ratio
	Fetal macrosomia
	Lower mean head:abdominal circumference ratio
Maternal factors	Maternal diabetes
	Advanced maternal age
	Increased maternal weight
	Relatively shorter maternal height
Perinatal factors	Shoulder dystocia
	Prolonged second stage of labour
	Use of oxytocin during first stage of labour
	Vaginal breech deliveries
	Instrumental vaginal deliveries
	Increased head-to-body delivery time, especially when >5 minutes
	Low Apgar scores

From Linder et al (2012); Ahn et al (2015); Choi et al (2017); McKee-Garrett (2017)

affected side can be placed in a long-sleeved garment and pinned to the chest with the elbow at 90° flexion (McKee-Garrett, 2017). Although some literature suggests repeating a radiograph after 2 weeks to demonstrate proper healing of the bone (McKee-Garrett, 2017), this is not usually performed in clinical practice in the UK.

Parents and community health professionals should be advised to look out for signs of a lump (callus formation) developing over the area. Congenital pseudarthrosis of the clavicle resulting from failed coalescence of two primary ossification centres may mimic a neonatal clavicle fracture – this needs referral to a paediatric orthopaedic surgeon (de Figueiredo et al, 2012).

Conclusions

If there is delayed detection of a neonatal clavicle fracture, discussion with relevant specialists is crucial to assess the timing of the injury and prevent unnecessary child safeguarding investigations. When a neonatal clavicle fracture is detected pre-hospital discharge clear documentation in the clinical notes is important as this may have medicolegal implications. In cases where there remains a strong suspicion, appropriate child protection procedures and investigations should be instigated. **BJHM**

LEARNING POINTS

- A significant proportion of neonates with clavicle fractures may remain undetected at newborn examination before discharge from hospital, especially when the fracture is non-displaced.
- Clavicle fracture in the neonate may occur in uncomplicated and caesarean section deliveries.
- Child safeguarding concerns may arise in cases of delayed detection.
- Early involvement of specialists is necessary for timing the injury in delayed detection of neonatal clavicle fractures as this has implications for the decision-making process.

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