Cephalhaematoma – a benign condition with serious complications: case report and literature review

Neonatal cephalhaematoma is a common outcome of minor birth trauma. It is usually benign and resolves spontaneously without treatment. Complications are rare but potentially serious. A case of an infected cephalhaematoma is described. Early diagnosis and treatment of infected cephalhaematomas are essential to prevent serious complications such as meningitis and osteomyelitis.

Introduction

Cephalhaematoma is usually a benign haemorrhage between the periosteum of the skull and calvarium. It rarely causes concern in the neonatal period but may deserve more attention. We describe a case of complicated cephalhaematoma, review the literature and also discuss the possible complications.

Clinical course

A male infant was born by normal vaginal delivery at 37^{+6} weeks' gestation weighing 3.861kg with apgar scores of 9 and 9 at 1 and 5 minutes. He was born following an uncomplicated pregnancy. The perinatal course was uneventful with no risk factors for sepsis. The newborn examination was normal apart from a swelling in the scalp but no erythaema was noted.

On day 8, he presented with neonatal jaundice. The serum bilirubin was 138mg/dL and did not require any treatment. A very large cephalhaematoma was noticed measuring 14cm x 10cm in the right parieto-occipital region. The depth was 2.8cm measured by ultrasound scan. He was otherwise systemically well and admitted to the neonatal unit for observation and further investigations. Pyrexia developed on the day of admission and remained a cause of concern.

A skull X-ray (**FIGURE 1**) showed soft tissue swelling but no fractures. The inflammatory markers included a C- reactive protein (CRP) of 191mg/L and a white cell count (WCC) of 10,600/mm^3. The clotting screen was normal with a prothrombin time (PT) of 11 sec and activated partial thromboplastin time (APTT) of 28 sec. The haemoglobin (Hb) was 12.8gm/dL and platelet count was 249 x 10^9/L. The CSF studies were normal.

The child was treated for presumed sepsis with five days of IV cefotaxime. The blood culture was negative. The CRP decreased to 48mg/L on day 13 of life.

Cranial ultrasound scan showed a fluid collection under the scalp confirming a cephalhaematoma. The baby had a continuing fever during his admission and on day 13 of life, respiratory syncytial virus (RSV) was found on a nasopharyngeal aspirate. At that point, the cephalhaematoma was softer and was decreasing in size. As he remained well, he was discharged home on day 14 of life.

On day 16 of life (**FIGURE 2**) he re-presented with a larger cephalhaematoma (14cm x 14cm) with overlying erythaema and a temperature of 38.1°C. He was intermittently irritable, tachycardic with normal perfusion and a tense anterior fontanelle. A full infection screen was carried out. He had raised inflammatory markers with a CRP of 223mg/L, WCC of 12,900/mm^3 and the platelet count was 311 x 10^9/L. The clotting screen was normal with a PT of 11 sec and APTT of 23 sec. The CSF studies were normal.

He was started on IV cefotaxime and gentamicin. A diagnostic aspiration at the apex of the cephalhaematoma produced 10mL of pus and altered blood. The blood culture and the pus cultured from the cephalhaematoma grew *Escherichia coli* sensitive to cefotaxime and gentamicin.

Siba Prosad Paul
MBBS, DCH
Paediatric Registrar
siba@doctors.org.uk

Timothy M Taylor
MBBS, FRCPCH
Consultant Paediatrician

Sujata Edate
MBBS, DCH, DNB (Paed), MRCPCH
Paediatric Speciality Registrar

St Richard's Hospital, Chichester

Keywords

cephalhaematoma; infection; diagnostic aspiration; *Escherichia coli* infection

Key points

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1. Cephalhaematoma is usually a benign neonatal condition resolving spontaneously without any medical intervention.
2. Infection of the cephalhaematoma can occur leading to complications such as meningitis and osteomyelitis.
3. Clinical suspicion of infected cephalhaematoma should lead to diagnostic tap.
4. Treatment of infected cephalhaematoma is likely to combine antibiotic treatment and consideration of surgical drainage.

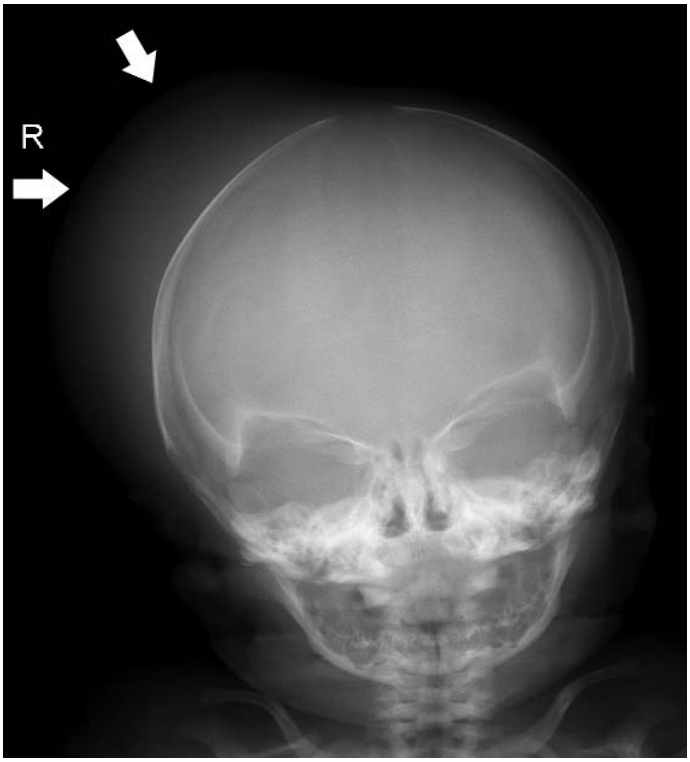

FIGURE 1 Skull X-ray showing right-sided soft tissue swelling.

He was referred to the tertiary paediatric surgical unit following stabilisation for incision and drainage.

A Penrose drain was inserted after irrigation with normal saline and removed after three days. The wound was then packed with Sorbsan™ dressing for the next few days.

He improved following the procedure. The fever settled within two days of incision and drainage. He received five days of IV gentamicin and two weeks of IV cefotaxime. He was doing well when he was followed up at six weeks of age.

Discussion

Definition and aetiology

A cephalhaematoma is a subperiosteal collection of blood bound by tight periosteal attachments at the sutures and generally occurs as a result of birth trauma[1-3]. Vaginal delivery is not a prerequisite and it also occurs in babies following caesarean sections[1]. In the absence of trauma during delivery eg in C-sections, it has been hypothesised that it may result from the differential between the intrauterine and extrauterine pressure[1].

It occurs in 1-3% of live births however the incidence reportedly can be up to 4% following instrumental deliveries[1-6]. Approximately 15% are bilateral[1].

What is already known:

- Most common location is over the parietal and occipital bones.
- Calcification (usually curvilinear) can be present from two days to four weeks after the birth trauma, with noticeable bulge of the calvarium
- Progressive ossification may occur with resolution of the haematoma and deformity of the calvarium for weeks or several months
- These collections should not be routinely aspirated as there is a risk of secondary infection[5,7,8]
- Skull X-ray and CT scan do not diagnose infected cephalhaematoma but may demonstrate the complications of osteomyelitis[7,8]
- It is very important to distinguish a cephalhaematoma from a subgaleal haematoma as the latter cross suture lines and are associated with complications of hypovolaemia, jaundice and coagulopathy[9].

Complications and associations of cephalhaematomas

Cephalhaematoma is generally a benign condition resolving within a week to a month[1,2,4,5,6,10]. Some calcify at the end of the second week.

Complications are uncommon but include hyperbilirubinaemia, late onset anaemia, infection of the cephalhaematoma, sepsis, osteomyelitis and meningitis.

Skull fractures may be associated with cephalhaematoma. A linear skull fracture[1] is seen in 5% of unilateral and 18% of bilateral cephalhaematoma patients. A depressed skull fracture is present in a minority of cases[1].

Radiological investigations like skull X-ray, CT or MRI scan may be required to detect a depressed skull fracture as it may be difficult to detect on clinical examination[1,7,8].

There are reports of a dural tear associated with skull fracture causing a CSF leak[1] from the subarachnoid compartment mimicking a nonresolving cephalhaematoma and requiring neurosurgical management.

Clinical and microbiological findings in infected cephalhaematomas

The signs of an infected cephalhaematoma[5,6,8] are overlying erythaema, increasing size, delay in resolution, a fluctuant mass, fever and other nonspecific symptoms of sepsis such as reduced feeding. Investigations may show raised inflammatory markers.

Physicians need to be aware that although fever is the most common systemic manifestation, it may occur in less than 60% of patients[5].

Escherichia coli was isolated in 50% of cases of aspirated cephalhaematomas in the Medline search conducted by Allen et al[8]. In a study of 28 neonates with suspected infected cephalhaematomas at the Mackay Memorial Hospital, Taipei from 1978 to 2003, *Escherichia coli* was the most common bacterial species isolated followed by *Staphylococcus aureus*[5].

Brook et al[11] described six neonates where polymicrobial

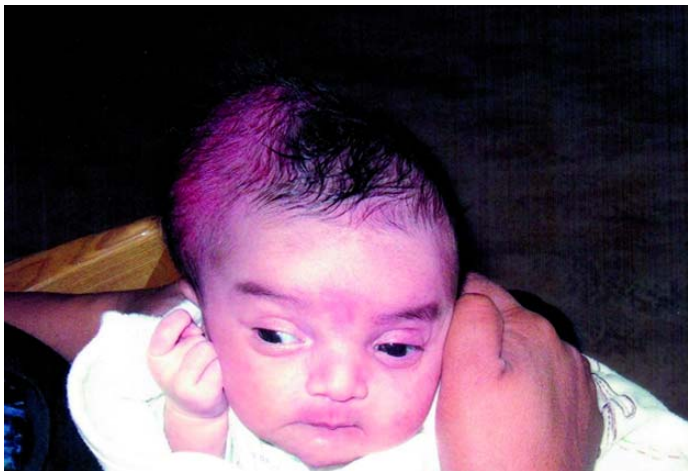

FIGURE 2 At re-presentation with infected cephalhaematoma. Parental consent was obtained for this photograph.

infection was identified in all the cases of infected cephalhaematomas. Other bacterial species including Salmonella[11], *Escherichia hermannii*[12] and *Peptostreptococcus sps*[11] have been reported in the literature but are rare.

Management of cephalhaematomas

The management of an uncomplicated cephalhaematoma is conservative with a wait and watch approach. Underlying skull fractures[1] do not pose a therapeutic problem unless there is significant depression of bone fragments.

To date no non-invasive investigative tool for diagnosing an infected cephalhaematoma has been reported. Plain radiographs, bone scans, and enhanced CT scans are unable to detect infection in a cephalhaematoma unless associated osteomyelitis co-exists[7,8].

MRI scan[7] with gadolinium enhancement may be the most sensitive investigation for the early detection of associated signs eg: periosteal inflammation. This would indicate the need for a diagnostic aspiration to confirm an infected cephalhaematoma particularly in the absence of signs such as overlying scalp erythaema.

Aspiration[5,6,8] by aseptic technique is the diagnostic and therapeutic procedure of choice for diagnosing infected cephalhaematomas.

The paediatric surgical team[8,11] needs to be aware of this potentially serious condition and needs early involvement. Due to the increased association of infected cephalhaematoma with sepsis and meningitis, complete sepsis workup is indicated[2,4,5,6,8].

Literature review[2,5,6,8,13] suggests antibiotic treatment for two to six weeks is appropriate. However evidence is sparse. The duration will be influenced by the presence or absence of co-existing pathology eg: osteomyelitis. In this patient surgical incision and drainage and two weeks of antibiotics lead to complete recovery.

Conclusion

This case illustrates the importance of being aware of the potential complications of neonatal cephalhaematomas even though in the majority of cases these resolve without treatment. Rarely they may become infected and early treatment can avoid osteomyelitis and meningitis. We hope this case report heightens awareness of this rare but important condition.

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