Scalp osteomyelitis of the occipital bone in a neonate: An unusual sequel of a scalpel injury at birth

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Case report

A female infant was born to a 27-year-old primigravida mother at 39 gestational weeks by emergency lower segment caesarean section (LSCS) done for oligohydramnios. The mother had 'A' positive blood group and an uneventful antenatal period. The baby's birth weight was 3100g which was appropriate for her gestational age. Baby cried immediately after birth and the postnatal transition was uneventful.

There was a significant history during the LSCS of a scalpel injury over the occipital region, approximately 0.5 x 0.5 x 0.5cm. No suturing was done and the contused lacerated wound was managed with local antibiotic ointment. Baby was exclusively breastfed and discharged on day 5 of life. Baby was re-admitted on day 21 of life with a similar complaint of abscess at the same site for 3 days; the abscess was drained and oral antibiotics (syrup amoxicillin and clavulanic acid) were given for 10 days. Infant was re-admitted on day 54 of life with swelling over the same occipital region of the scalp of 1 week duration which was gradually increasing in size with discharging pus. On the day of admission, the baby's vitals were stable without tachycardia or tachypnoea and the baby was clinically examined for signs of meningitis, facial nerve palsy and neurological deficit. Other possibilities of late onset sepsis and trauma causing osteomyelitis were also kept in mind. Baby was empirically started on intravenous (IV) antibiotics (ceftriaxone and amikacin) in view of discharging pus from the swelling and was strictly monitored for seizures and shock.

On day 1 of admission baby was afebrile and haemodynamically stable. Baseline haematological work-up was done. The haemoglobin level was 10.1g/dl, the total leucocyte count was 14,300/ cu mm (P 54%, L 40%, M 4%, E 2%) and the platelet count was 500,000/ cu mm. Serum sodium was 141mEq/L (normal range 133-142mEq/L), serum potassium was 4.6mEq/L (normal range 3.5-5.0mEq/L) and serum calcium was 9.8mg/dl (normal range 8.0-10.7mg/dl).

Baby had intermittent spikes of fever from day 5 of admission with a maximum temperature of 101^0F. X-ray skull (antero-posterior and lateral views) was done to look for fracture but was normal. Pus specimen was sent for culture and antibiotic sensitivity and revealed a growth of Methicillin Resistant *Staphylococcus Aureus* (MRSA) resistant to B-lactams, carbapenems and monobactams. In view of the pus culture sensitivity report and good bone penetration of vancomycin, this antibiotic was added. Baby became afebrile since day 7 of admission till discharge and the complete blood count and biochemistry done before discharge were normal. There were no complications during the hospital stay like poor feeding, lethargy, temperature instability or decreased urine output suggestive of shock or vomiting, seizures, posturing suggestive of meningitis with raised intracranial pressure.

Infant's ultrasonography (USG) of the occipital region of the scalp revealed a sub-galeal swelling of size 15 x 12 x 9 mm which was extending into the suture and indurating the dural sinus with bone within and there was a strong possibility of osteomyelitis. Contrast enhanced magnetic resonance imaging (CE MRI) was done which revealed partial destruction of the occipital bone in the midline with associated soft tissue component. The soft tissue component showed intermediate signal on T1W1, appeared hyperintense on T2W1

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and showed heterogenous post-contrast enhancement. The soft tissue was extending into the overlying scalp tissue and causing focal contour bulge with focal breach in overlying skin. Anteriorly, it was abutting both cerebellar hemispheres (left>right) and left occipital lobe without underlying signal changes in the brain parenchyma. Findings were consistent with osteomyelitis of the occipital bone with associated soft tissue component (Figures 1 and 2).

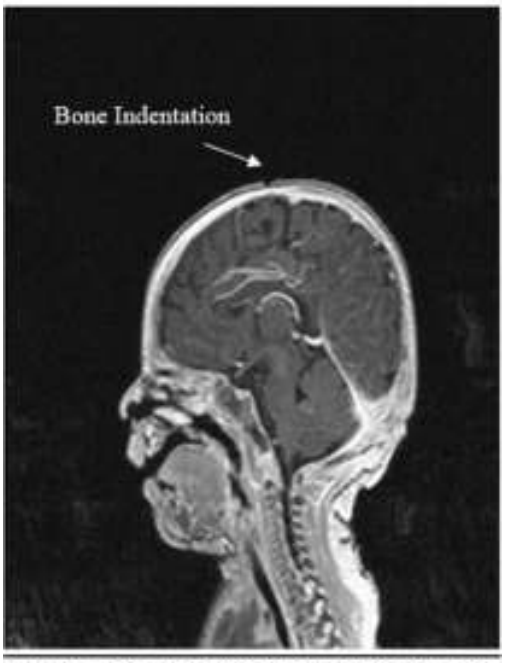

Figure1: ***Bony indentation of skull in MRI***

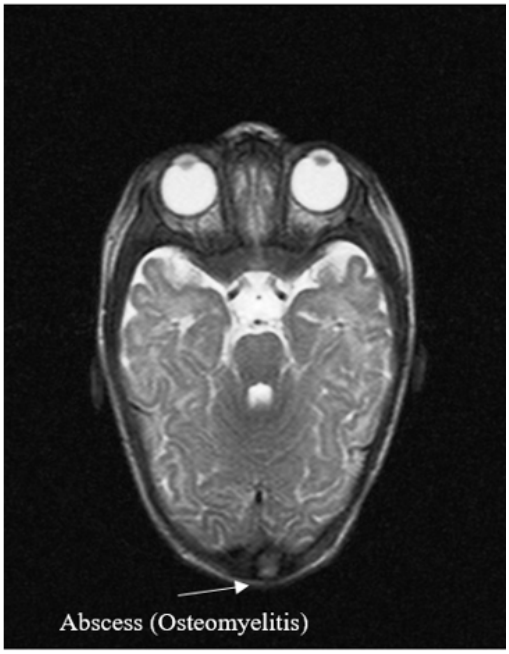

Figure2: ***Abscess (osteomyelitis) in MRI skull***

Baby received a full 2-week course of IV vancomycin and was discharged on oral linezolid for 4 weeks. Hearing evaluation and eye examination were done which were normal. USG before discharge showed decrease in size of bony defect to 4.8 x 10 x 7mm and the number of bony contents was reduced in comparison to the previous scan.

Discussion

The skull is the second common site of osteomyelitis in a previously healthy term neonate. Generally, infection of the flat bones of the skull follows either iatrogenic injury or cephalhaematoma. Fetal scalp electrodes are a common inciting traumatic event[1]. Skull bone osteomyelitis has an estimated incidence of around 1 in 10,000 and has different aetiologic possibilities[2,3]. Osteomyelitis following fetal scalp monitoring is caused by infection with organisms that are part of normal flora of the cervix and vagina, which may differ from organisms in an infected cephalhaematoma. The implicated pathogenesis is bacteraemial spread of infection. The factors which predispose to bacteraemia in the preterm are umbilical catheterization and septic emboli formed on vascular catheters[4]. The organisms known to be associated in 50% of cases are *Escherichia coli* and *Staphylococcus aureus*. In recent years methicillin-resistant *Staphylococcus aureus* (MRSA) has become a common bacterium causing an abscess. Group B Streptococcus (GBS) and coagulase negative staphylococci are gram-positive organisms, which are potential pathogens of osteomyelitis in neonates. In the extreme preterm *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella enteritidis* and *Citrobacter freundii* are causative organisms of osteomyelitis[5].

Neonates with skull infections fall into two categories: those who have minimal symptoms and those who are very sick with obvious symptoms. The mortality is high in the second group[6]. Plain x-ray films and USG of the local part are useful for diagnosing scalp osteomyelitis but MRI of the skull is the modality of choice because it reveals the degree of bony destruction (which was similar to our case), acutely defines soft tissues and has a good sensitivity in the early part of the illness[7].

Treatment of neonatal osteomyelitis is prompt initiation of antimicrobial therapy and timely surgical drainage. Every effort should to be made to culture and identify the causative organism from pus/blood. Empirical treatment with oxacillin or nafcillin and an aminoglycoside such as gentamicin/tobramicin should be started. If the suspicion of MRSA is high, then vancomycin has to be added upfront[5-7].

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