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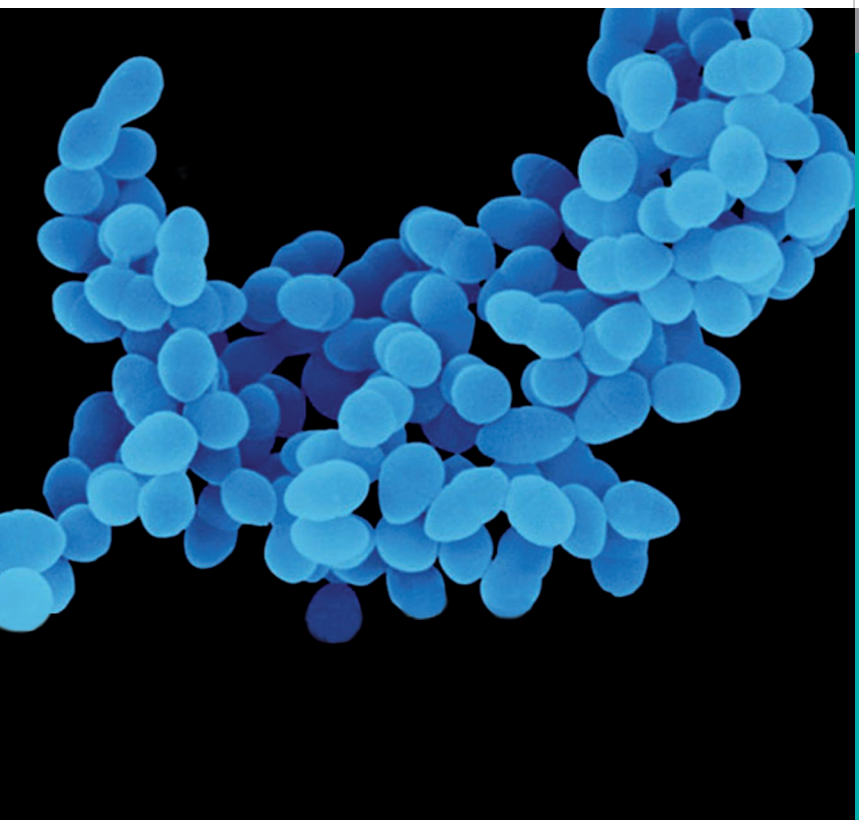
# Severe complications in preterm infant with late-onset staphylococcus aureus sepsis



September 2013

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The first outbreak caused by Staphylococcus aureus was reported in 1904 (1) . Nosocomial infections caused by Staphylococcus aureus became clinically important in the 1970's (2). Nowadays Staphylococcus aureus is a leading cause of late-onset sepsis in neonates. A distinction is made between early-onset sepsis (EOS), occurring before the age of 48 hours of life, and late-onset sepsis (LOS), starting after day two of life. In an era of increased maternal intrapartum antibiotic use, the incidence of EOS has decreased continuously whereas a shift towards LOS has been noted – with a rising incidence of about 13% altogether (2). Coagulase-negative Staphylococcus (most common pathogen) and Staphylococcus aureus (second most common pathogen) together account for approximately 90% of the sepsis cases with an onset later than day seven of life.

In VLBW infants, the incidence of LOS is four times higher than in term neonates. This is in part due to immature host defense mechanisms but also related to invasive therapies, particularly those requiring central lines and mechanical ventilation.

Clinical signs of LOS are non-specific and include apnea and bradycardia, tachycardia, arterial hypotension, paleness, hypo- or hyperthermia, irritability or apathy, and feeding intolerance. If LOS is suspected, a complete sepsis work-up (including cultures of blood, urine, and CSF) is indicated.

This female twin B was delivered at 29 5/7 weeks of gestation by Caesarian section to a 36-year-old healthy G1/P1 following rupture of membranes of twin A and failed tocolysis. Antenatal steroids could not be administered in a timely fashion. Up to this moment, the dichorionic diamniotic twin pregnancy following intracytoplasmic sperm injection (ICSI) had been uneventful.

Twin B adapted with an Apgar score of 4, 7, 8 at 1, 5, and 10 minutes, respectively. A short period of mask ventilation was required, oxygen was supplied and nasal CPAP was installed. The infant was transferred to the NICU. Except for respiratory distress, clinical examination was unremarkable. The birth weight was 1390 grams.

During the first week of life, the baby required nasal CPAP and caffeine because of apnea of prematurity. She was otherwise healthy. On day 9 of life, there was rapid clinical deterioration. Pustulous skin lesions on the face were noted. Following a sepsis work-up, antibiotics (flucloxacillin and gentamicin) were administered intravenously, and vancomycin was added temporarily. Blood and CSF cultures returned positive for Staphylococcus aureus. Based on sensitivity testing, antibiotics were changed to monotherapy with ceftriaxone on day 12 of life.

Due to increasing apneas, invasive mechanical ventilation was required from day 11-14. Platelets and packed red blood cells were transfused. Enteral feeding was poorly tolerated and parenteral nutrition was provided for seven days.

On day 12, three new skin abscesses were noted, one on the left arm, the second over the sternum and the third on the right parieto-occipital region (Fig. 1). Smears were again positive for Staphylococcus aureus. Pus was drained and surgical management of the wound was necessary (Fig. 2). At the same time, the infant developed a left-sided pneumonia and pleural effusion (Fig. 3, 4) from which the same microorganism was recovered. Several echocardiographic exams showed no signs of endocarditis. Cerebral ultrasound at the age of four weeks revealed a left-side parieto-occipital cyst (7x7 mm) interpreted as a possible abscess. At the chronological age of 3 months, magnetic resonance imaging confirmed a cystic lesion felt to be related to the infection (Fig. 5, 6).

Due to the various foci of infection, gentamicin was added (days 15-33) to the antibiotic therapy with ceftriaxone (days 12-33). From days 33-40, flucloxacillin was administered (day 33-40). The infant recovered and was discharged home at 43 weeks postmenstrual age (Fig. 7).

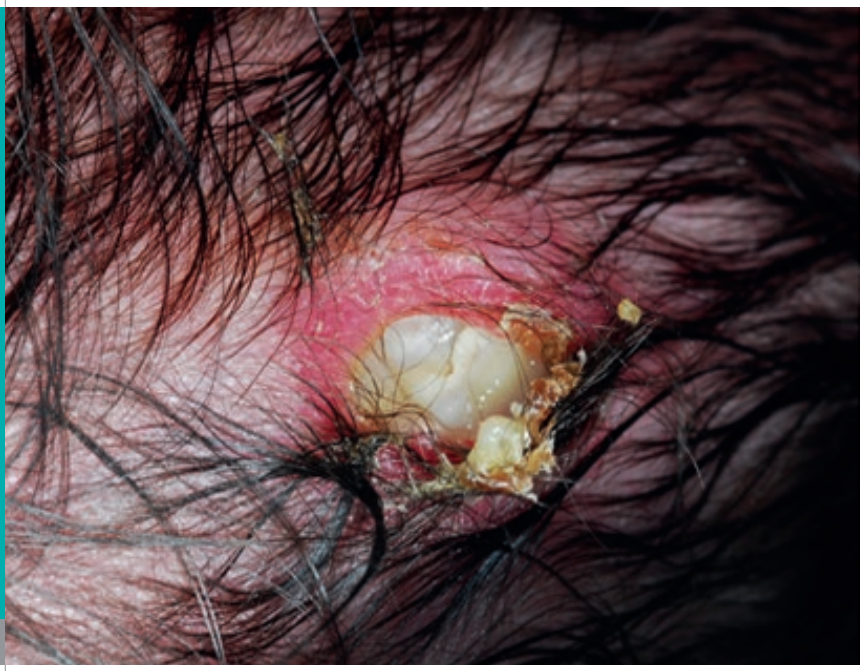

**Fig. 1**

*Cutaneous abscess in the right parieto-occipital region.*

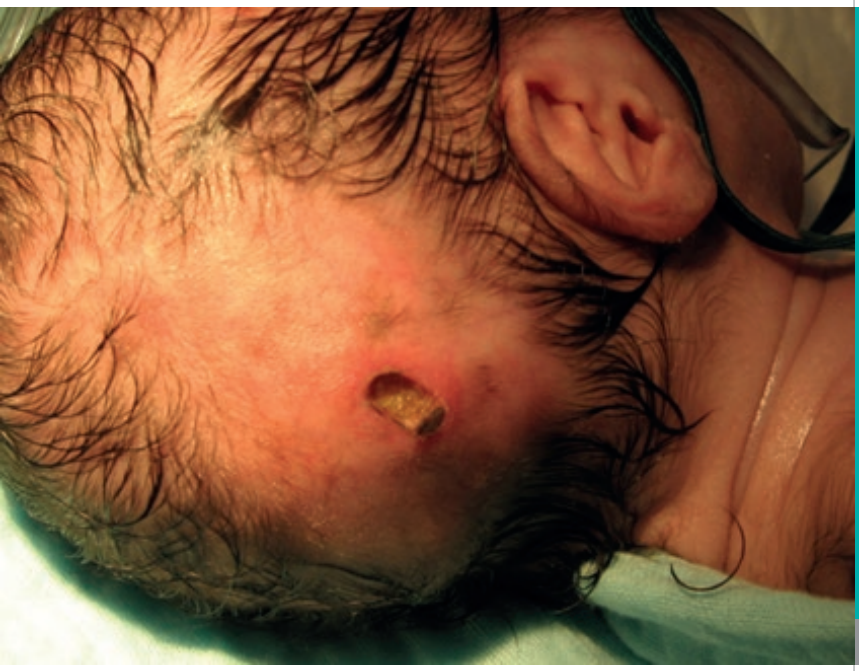

**Fig. 2**

*Parieto-occipital abscess after incision and drainage.*

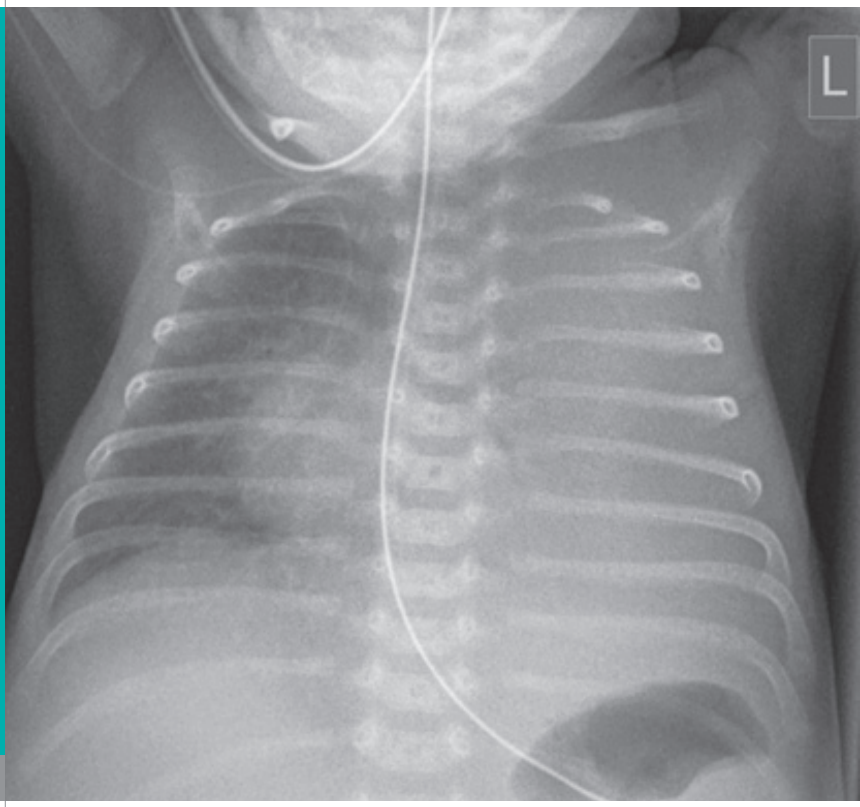


**Fig. 3**

*Chest X-ray on day 12 of life: opacification of the left hemi-thorax.*

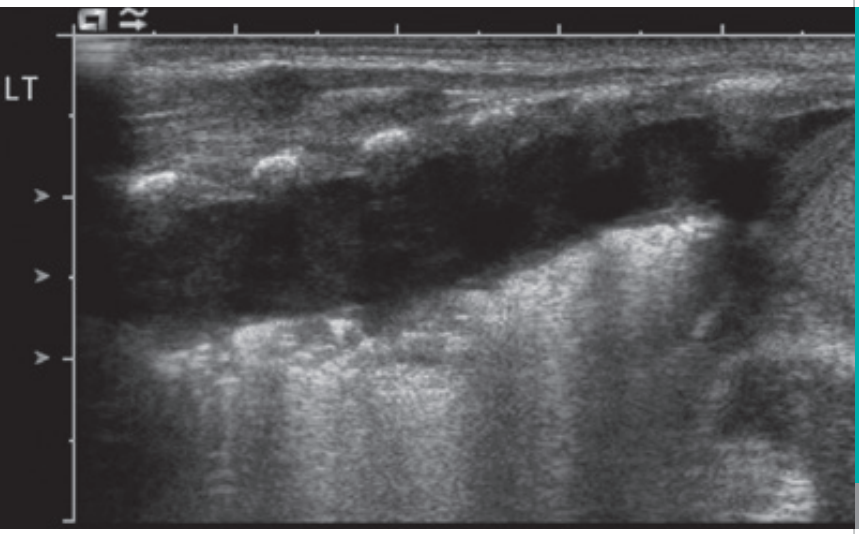


Fig. 4

*Ultrasound revealing left-sided pleural effusion.*

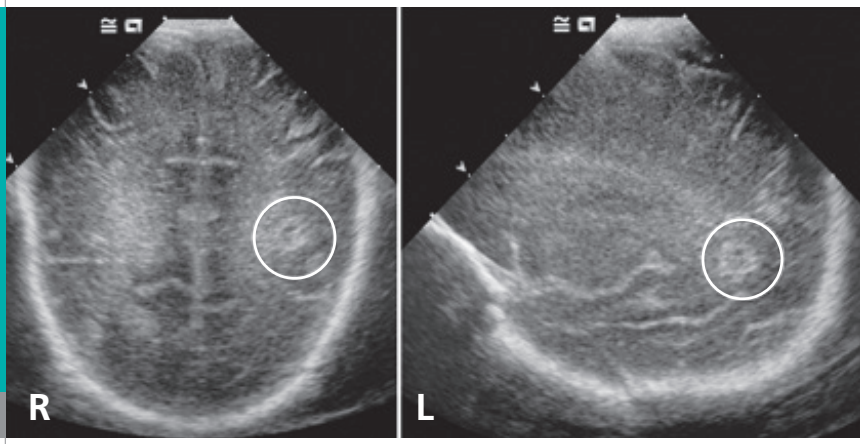


**Fig. 5**

*Cerebral US with small ring-like lesion in the left parieto-occipital region.*

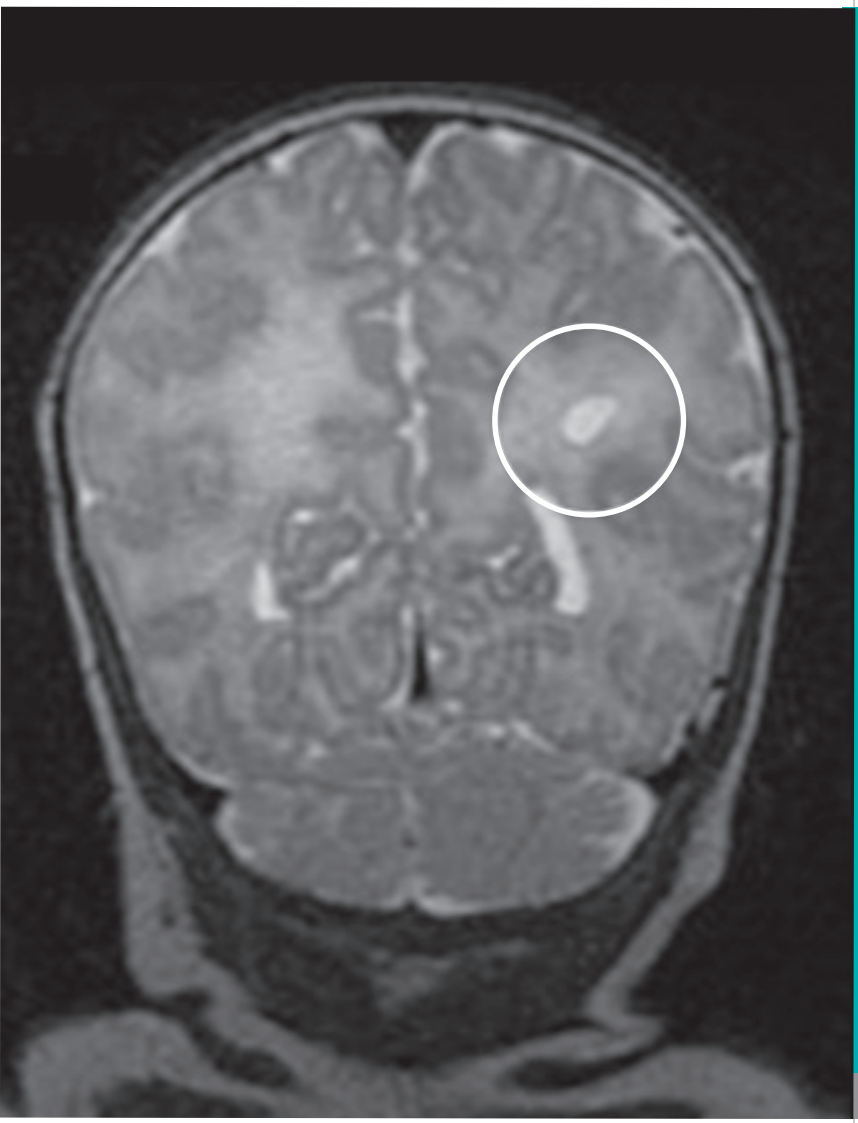

Fig. 6

*MRI of the head at a chronological age of three months: T2-weighted coronal image revealing a cystic white matter lesion (circle).*

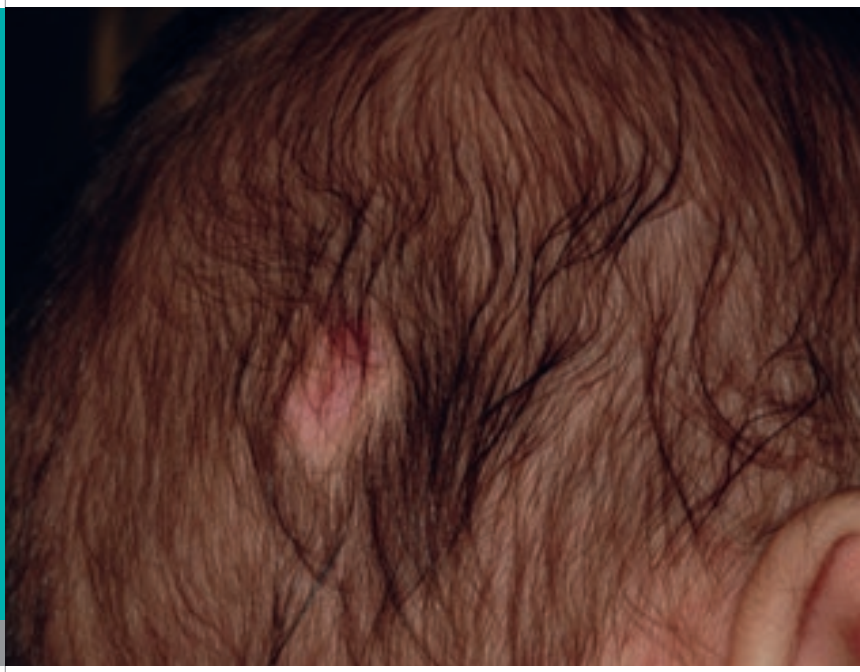

**Fig. 7**

*Cutaneous parieto-occipital lesion 4 weeks after completion of antibiotic treatment.*

LOS with Staphylococcus aureus in the premature infant is a rare but potentially life-threatening complication (3). According to the literature, neonates with Staphylococcus aureus infection have a median gestational age of 27 weeks and a median birth weight of 800-1000 grams and the onset of infection occurs at 9 to 14 days of age.

As in our case, LOS with Staphylococcus aureus usually presents with clinical deterioration of the child and arterial hypotension is common (1). Evidence for focal infection is seen in about half of the cases, and frequently involves more than two sites of infection (1, 4, 5). Skin and soft tissue lesions such as rash, abscess, and cellulitis are common. As in our case, pustules are the most common skin efflorescence. Bone and joint involvement, endocarditis, pneumonia and meningitis have also been described (1, 4-6).

The mortality rate of neonates with LOS due to Staphylococcus aureus is 5-10% overall (1, 4), but much higher in preterm infants (4). The risk of a poor outcome (death or sequelae) is increased with lower gestational age and low birth weight, EOS and male gender (3, 4). Long-term sequelae such as bone/joint deformities or persistent organ dysfunction reportedly occur in about 30% of the infants surviving (1).

## CONCLUSION

LOS with Staphylococcus aureus is responsible for a significant disease burden in neonates treated in neonatal intensive care units. Empiric antibiotic treatment of LOS should cover this organism.

## REFERENCES


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