European S T80 Community-Associated Methicillin-Resistant Staphylococcus Aureus Orbital Cellulitis in a Neonate.

Staphylococcus Aureus Orbital Cellulitis in a Neonate.

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Abstract

Background
Methicillin-resistant *Staphylococcus aureus* is a serious cause of morbidity and mortality in hospital environment, but also, lately, in the community. This case report is, in our knowledge, the first detailed description of a community acquired Methicillin-resistant *Staphylococcus aureus* ST80 orbital cellulitis in a previously healthy neonate. Possible predisposing factors of microbial acquisition and treatment selection are also discussed.

Case presentation
A 28-day-old Caucasian boy was referred to our hospital with diagnosis of right orbital cellulitis. His symptoms included right eye proptosis, periorcular oedema and redness. Pus cultures grew Methicillin-resistant *Staphylococcus aureus* and molecular analysis revealed the ST80 (Panton-Valentine leucocidin-positive) isolate. Antimicrobial treatment with ceftriaxone, daptomycin and rifampin successfully controlled the infection within 42 days.

Conclusions
Clinicians should be aware that young infants, even healthy ones, are susceptible to orbital cellulitis caused by community-associated Methicillin-resistant *Staphylococcus aureus*. Prompt initiation of the appropriate empirical therapy should successfully address the infection, preventing ocular and systemic complications.

**Background**

Over the past decades, the incidence of community-associated Methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections has constantly been rising, due to the development of highly virulent and transmissible strains.\(^1\) In a recent study performed in our area, CA-MRSA was found to be increasing as a cause of skin and soft tissue infections, as well as of the invasive ones, among all pediatric ages.\(^2\) In our country, this expansion is associated with the wide spread of a single virulent clone, the European ST80, in the community. According to the studies of Fortunov et al, community-associated MRSA infections are also increasing in previously healthy neonates without traditional risk factors\(^3,\,4\) and males are most often affected between 7 to 12 days of age. Community-associated MRSA is considered to be genetically different from classic hospital acquired MRSA.\(^5\) The latter is typically highly resistant to essentially all antibiotics except vancomycin and linezolid. Conversely, like in our case, the isolate is typically sensitive to additional antibiotics, including trimethoprim-sulfamethoxazole, rifampin, and clindamycin. Resistance to fusidic acid and tetracycline is also consistent with recently published data from our geographic region\(^2\) where 88.9% of MRSA isolates were resistant to fusidic acid and 77.6% to tetracycline.
Cases of community-associated MRSA periocular infections in paediatric patients have been reported, the most recent being a report of two cases of infantile community-associated MRSA orbital cellulitis, by Kobayashi et al.\textsuperscript{6} Kodsi\textsuperscript{7} reports a case of an 8.5-month-old boy with chronic dacryocystitis secondary to community-associated methicillin-resistant \textit{Staphylococcus aureus}. According to the author, this child’s infection may have been related to chronic oral antibiotics administered since birth to prevent urinary tract infections related to hypospadias. Another case of perinatally acquired community MRSA dacryocystitis and periorbital cellulitis in a 12-day-old previously healthy neonate has recently been reported.\textsuperscript{8} In this patient, vertical transmission of MRSA may have occurred during vaginal delivery or subsequent close contact, including breast feeding. Mother, during or after delivery, family members or birth in the hospital may be implicated in community-associated MRSA acquisition. An interesting study of more than 5,000 pregnant women proved that 3.5\% of them had vaginal colonization with MRSA. There was no evidence of MRSA disease among their newborn children.\textsuperscript{9} These findings, however, suggest that vertical transmission of MRSA is theoretically possible during vaginal delivery.

A recent study of Fortunov et al.\textsuperscript{10} revealed that healthy term and late preterm neonates were more often infected by \textit{Staphylococcus aureus} with their own nasal strain than with their mother’s nasal strain.

In order to highlight the wide age and clinical manifestation spectrum of CA-MRSA infections, we report a case of perinatally acquired MRSA orbital cellulitis.

\textbf{Case presentation}
Our patient, a 28-day-old boy, was referred to the Paediatrics Department of our hospital with diagnosis of right-sided orbital cellulitis. His symptoms, including anorexia, rhinorrhoea, and right eye redness had begun five days before admission.

The newborn was delivered vaginally and was full-term. Birth weight was 4,100g, and he was on breast and formula combined feeding pattern.

On admission, the patient’s temperature was 37.7°C, heart rate was 132 beats / min, and physical examination revealed no other pathology except right eye proptosis, conjunctival injection and periorbital erythema.

White blood cell count was 19,000 cells/mm$^3$ with differential of neutrophils 49%, lymphocytes 29%, monocytes 11%, eosinophils 5%, myelocytes 1% and mononuclear lymphocytes 5%. Platelets count was 335,000/mm$^3$. Blood, urine, and cerebrospinal fluid samples were cultured and proved sterile. The examination of cerebrospinal fluid showed 300 RBC/mm$^3$, 2 WBC/mm$^3$, glucose 70 mg/dl with concurrent blood glucose 118 mg/dl, protein 52 mg/dl and LDH 24 IU/L. ESR was 92 mm/h and CRP 12 mg/dl.

Ophthalmic examination revealed right eye proptosis, periocular redness and oedema and conjunctival discharge. Ocular motility was severely impaired. Pupils were equal, round, normally reactive to light. Slit-lamp anterior segment examination and dilated fundus examination were within normal limits.

Brain MRI was normal and orbital MRI at 3.0T showed ethmoid opacification and a right eye proptosis due to an intra-orbital lesion, located in the retrobulbar fatty tissue between the medial, lateral, inferior rectus muscles and the wall of the globe. The lesion, containing multiple cystic regions, was consistent with orbital cellulitis with abscess formation.
Empirical therapy of intravenous ceftriaxone 100mg/kg, daptomycin 12mg/kg and rifampin 20mg/kg was started. Within 72 hours the size of the abscess expanded to the preseptal area and surgical drainage was performed through the inner area of the lower fornix. Cultures were taken, which grew *Staphylococcus aureus*. Molecular analysis of *Staphylococcus aureus* isolates revealed the ST80 (Panton-Valentine leucocidine-positive). The isolate was resistant to oxacillin, tetracycline, fucidic acid, and sensitive to clarithromycin, trimethoprim/sulfamethoxazole, vancomycin, rifampin, linezolid, moxifloxacin, daptomycin.

Antimicrobial treatment with ceftriaxone, daptomycin and rifampin lasting 42 days successfully controlled the infection. All symptoms gradually resolved and at 6 weeks follow-up both clinical examination and MRI findings were normal.

Maternal medical history and the thorough clinical and laboratory investigation failed to reveal obvious predisposing factors of community-associated MRSA acquisition or the site of entrance.

**Conclusions**

Clinicians should be aware that young infants, even healthy ones, are susceptible to orbital cellulitis caused by community-associated MRSA. Moreover, in these cases the way of microbial acquisition or the site of entrance may be unverifiable.

In areas like our geographic region, where community associated European ST80 MRSA is endemic as a cause of soft tissue infections, empirical therapy with agents active against community-associated MRSA should be started immediately in cases of orbital cellulitis.

**Consent**
Written consent was obtained from the patient’s parents for the publishing of this material. A copy of the consent is available for review.

**Competing interests**

The authors declare that they have no competing interests relevant to this article to disclose.

**Authors’ contributions**

EET was the main physician responsible for the patient, performed the abscess drainage and revised the manuscript, FZ performed manuscript writing, ING, SVT and ANM managed and followed the patient, EP performed the molecular analysis of the bacterial strain, MV performed MRI imaging and GAS assisted in drafting the manuscript. All authors read and approved the final manuscript.

**References**


Figure 1. Orbit MRI

Axial T1 post Gd MR image shows unilateral exophthalmos of the right eye due to inflammatory collections with central liquification and peripheral enhancement suggestive of a multiloculated abscess that occupy the inferior and posterolateral aspect of the orbit. The adjacent ethmoid sinuses are extensively mucus-filled with heterogeneous enhancement, consistent with sinusitis.