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CASE REPORT

Orbital cellulitis caused by community-associated methicillin-resistant *Staphylococcus aureus* in a previously healthy neonate

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KEYWORDS

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A 30-day-old, previously healthy, near-term neonate presented with fever and swelling of the left eye. Orbital cellulitis of the left eye was diagnosed by computed tomography. Both blood culture and pus that was drained from the orbital abscess were positive for methicillin-resistant *Staphylococcus aureus* (MRSA), which was found to be a strain indigenous to the local community by a molecular method. Using vancomycin therapy and surgical drainage, the infant recovered uneventfully. Orbital cellulitis in neonates may rapidly progress to abscess formation, even to sepsis, and *S. aureus* is the most common pathogen. With the increasing prevalence of community-associated MRSA, empiric antibiotics effective against MRSA should be first considered in endemic areas.

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Introduction

Community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections are increasingly seen among children, which causes skin and soft tissue infection as well as invasive life-threatening infections.^{1–4} However, CA-MRSA is still an uncommon pathogen in the neonatal population, except in some endemic areas.^{5–7} An orbital abscess is a well-delineated form of orbital cellulitis that is characterized by the formation of a collection of pus within the orbital tissue. In children, the most common source of orbital cellulitis is sinusitis.^{8,9} In neonates, orbital abscesses are extremely rare.^{10–13} Here, we report a case of neonatal orbital cellulitis with abscess formation and ethmoid sinusitis that was complicated by bacteremia caused by CA-MRSA.

Case report

A 30-day-old male infant was admitted to the neonatal intensive care unit of Chang Gung Children's Hospital due to a fever (up to 38.6°C), redness, swelling, local heat emanating from the left upper and lower eyelids, and progressive proptosis of the left eye that had been manifesting for 3 days. Medical history revealed an uncomplicated 36-week pregnancy, vaginal delivery, unknown maternal group B streptococcus status, and without a history of trauma, hospitalization, or circumcision. He had initially been brought to a regional hospital for help where he received antibiotics treatment with amoxicillin/clavulanate plus gentamicin for 2 days. However, he was transferred to our hospital due to persistent inflammatory signs in the left periorbital area.

Upon admission, blood examination showed a leukocyte count of 16,700 cells/uL (50% neutrophils, 29% lymphocytes, and 14% monocytes), a platelet count of 543,000 cells/uL, hemoglobin level of 9.7 mg/dL, and a serum C-reactive protein level of 70 mg/L (normal range: < 5 mg/L).

Serum alanine transaminase, blood urea nitrogen, and creatinine levels were normal. Vancomycin and ceftriaxone were prescribed. An orbital computed tomography (CT) scan with contrast enhancement was performed on the second day of hospitalization, showing low-density lesions with rim enhancement over the medial and superior aspects of the left eye globe, subperiosteal abscess formation, and opacity of the left ethmoid sinus (Fig. 1). Soon afterward, the baby underwent an orbitotomy with drainage of the intraorbital abscess. The blood culture obtained at the local hospital (on the first day of illness) subsequently reported MRSA, but the cerebrospinal fluid culture was negative for bacteria. The pus drained from orbital cellulitis also yielded MRSA. After surgical drainage, the fever abated and the local inflammatory symptoms and signs gradually improved. Intravenous vancomycin therapy—at a dosage of 45 mg/kg/day—was continued for a total of 14 days, and the patient was uneventfully discharged. He was clinically well without any complications at the 6-month and 1-year follow-up examinations after discharge.

The MRSA isolate from blood culture was subsequently characterized using molecular methods, including pulsed-field gel electrophoresis (PFGE), multilocus sequence typing (MLST), detection of Panton-Valentine leukocidin (PVL) genes, and determination of the staphylococcal chromosomal cassette (SCC) type, as previously described.^{3,4} The results show that the isolate was characterized as ST59/PFGE pattern D (similar to USA 1000)/SCCmec V_T/PVL-positive, which belongs to a CA-MRSA clone common in Taiwan.

Discussion

CA-MRSA is still an uncommon pathogen found in neonatal infections, except in some endemic areas, but an increasing trend can be expected in this population because CA-MRSA is increasing. During a 5-year period from August 2001 to July 2006 at Texas Children's Hospital,⁶ 84



Figure 1. Orbital computed tomography scan with contrast enhancement showing low-density lesions with rim enhancement over the medial and superior aspects of the left eye globe, subperiosteal abscess formation, and opacity of the left ethmoid sinus.

(67%) of 126 CA *S. aureus* infections in previously healthy neonates were caused by methicillin-resistant strains and the incidence of MRSA infections increased each year. Though most cases were skin and soft tissue infections, invasive diseases, such as bacteremia, osteomyelitis, myositis, empyema, urinary tract infection, meningitis, and septic shock,^{5,6} were also identified in 15 cases, of these eight were caused by MRSA. Bacteremia was identified in only four infants and MRSA was identified in two cases. In our case, the newborn infant first presented with orbital cellulitis that progressed to abscess formation and, subsequently, bacteremia that required surgical drainage. The isolate of MRSA was subsequently characterized as ST59/PFGE pattern D (similar to USA 1000)/SCCmec V₇/PVL-positive, a community strain in Taiwan, using molecular methods.^{3,4} The molecular characteristics of this community strain in Taiwan are different from those seen in the USA, which are usually characterized as ST8/PFGE USA300/SCCmec IV/PVL-positive or ST1/PFGE USA400/SCCmec IV/PVL-positive.^{1,2,5}

Orbital infections are extremely rare in neonates. Few cases have been reported, but a tendency of rapid evolution from orbital cellulitis to abscess formation has been reported.^{10–12} Cruz et al¹¹ reported two cases of neonatal orbital cellulitis in 2001 and reviewed the literature from 1959–1999, but only eight additional cases were identified. Among these 10 patients, eight cases developed abscess formation and seven patients required drainage, either surgical or spontaneous. Concomitant ethmoid sinusitis diagnosed via CT scan was also found in five cases, which was considered the cause of the orbital cellulitis. *S. aureus* was identified from the abscess in seven of the eight cases with identifiable pathogens. Two of these developed staphylococcal bacteremia. Another study from Australia reported four cases of orbital cellulitis caused by CA-MRSA. One of these cases was a 14-day-old female neonate. She underwent drainage of the orbital collection and received licomycin treatment for 21 days.¹³

In summary, here we report a rare case of neonatal orbital cellulitis with bacteremia caused by CA-MRSA. Orbital cellulitis in neonates may rapidly progress to abscess formation or even sepsis. Prompt and effective treatment is very important. Unlike older infants and children, *S. aureus* is the most common pathogen in neonates with orbital cellulitis and abscess. Due to the increase in CA-MRSA, empiric antibiotics active to MRSA should be first considered in endemic areas.

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