

C A S E R E P O R T

An unusual aggressive presentation of late onset sepsis due to *Staphylococcus Aureus* MRSA producing panton-valentine leukocidin in preterm neonate

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Abstract. We report an unusual and rare case of infection from methicillin resistant *Staphylococcus aureus* (MRSA) producing Panton-Valentine leukocidin in a preterm neonate in NICU. On day of life 8, a preterm baby boy suddenly developed arthritis, giant cutaneous abscesses and an osteomyelitic focus with poor clinical condition. This very aggressive presentation of infection from MRSA pushed us to test Panton-Valentine leukocidin, which resulted positive and to test contacts to discover the bearer of the germ. MRSA producing Panton-Valentine leukocidin is an unusual case of infection in preterm neonate that has not been reported elsewhere. A very aggressive sepsis in neonates from *Staphylococcus aureus* should evoke the need to test Panton-Valentine leukocidin to rapidly establish an appropriate treatment. We underline also the importance to test contacts to establish promptly a decontaminant therapy. (www.actabiomedica.it)

Key words: methicillin resistant *Staphylococcus aureus*, neonate, Panton-Valentine leukocidin, late onset sepsis, case report

Introduction

Staphylococcus aureus producing Panton-Valentine leukocidin is not a typical infection or complication of prematurity; it has been reported in children and young adults otherwise healthy. We report an unusual and rare case of infection from methicillin resistant *Staphylococcus aureus* (MRSA) producing Panton-Valentine leukocidin in a preterm neonate in NICU.

Case Report

On day of life 8, a preterm baby boy (GA 32 + 3/7 weeks, birth weight 2100 gr) suddenly developed an arthritis of left shoulder and a giant cutaneous abscess

over the xiphisternum (maximum diameter 7 cm) (shown in Fig. 1). In a few days, abscesses appeared at the right jaw and clavicle as well as arthritis of right hip and osteomyelitic focus in the right femur. The clinical condition of the baby deteriorated as this clinical picture appeared with superior left limb not moving, reduction of right leg mobility, poor perfusion, lethargy, pain at handling and feeding intolerance requiring parenteral nutrition in association with milk feedings. He was supported with fluids (no need for inotropes) and non-invasive respiratory support (CPAP, maximum FiO₂ 0.30 continued for 6 days) for the onset of respiratory distress. Vital signs (PA, FC) were stable.

Radiologic and ecographic imaging confirmed the arthritis and the abscesses reported above. A whole



Figure 1. Legend text: giant cutaneous abscess over the xiphisternum before drainage (maximum diameter 7 cm).

body MRI showed, moreover, a cavitating lesion (14x8mm) in the right lung base, which was not evident on chest X-ray.

A MRSA was quickly isolated from several blood cultures, as well as in the purulent aspirates of sterna region and left shoulder. The antibiogram showed a *Staphylococcus aureus* resistant to Meticillin, Quinolones and Clindamycin. Vancomycin was started based on multiple microbiological isolations and clinical feature. The serious and rapid progression of the disease pushed us to test the MRSA strain for production of Panton-Valentine leukocidin, although it is not a typical neonatal infection, which resulted positive. The cerebrospinal fluid culture was negative. The immune function screening on the baby (lymphocyte subpopulations, mitogen tests, NBT test) was negative.

The impairment of the overall clinical conditions, the rapid progression of abscessual lesions and the positivity of the Panton-Valentine leucocidin, led to a rapid antibiotic treatment switch adding Linezolid

and Rifampicin, molecules that may hamper toxins production. The complex antibiotic therapy, together with IgM enriched immunoglobulin (1), was administered intravenously for the first 4 weeks and then, switched to oral for further 2 weeks with linezolid and rifampicin only. The neonate also underwent to local therapy with mupirocin 2% intranasal and chlorhexidine 4% baths to reduce cutaneous and nasal carriage.

The baby required 2 aspirations of purulent fluid from the arthritis of left shoulder to recover arm motility and relieve pain and 3 drainage from the xiphisternum abscesses.

No other neonates had such infection at that time in the NICU nor were colonized by MRSA at the routine weekly surveillance for infection control in the NICU.

Father, after a depth and targeted anamnesis to discover the origin of such infection, revealed a history of recurrent cutaneous abscess; therefore, both parents underwent to nasal swabs resulted positive for nasal colonization with MRSA. Consequently, they performed decontaminant therapy (mupirocin 2% intranasal and chlorhexidine 4% baths for 5 days).

The patient was safely discharged home at 41 weeks with motility recovery of left upper limb and healing of the all clinical picture.

A medical examination at 4 moths of life showed the baby in good clinical condition.

Discussion/Conclusion

The production of Panton-Valentine leukocidin (PVL) is a rare and unusual occurrence in the neonate that adds destructive potential to MRSA. PVL is a porin-like exotoxin that lyses leukocytes and leads tissue damage and necrotizing inflammation. Such infection has been reported as an unusual cause of community-acquired pneumonia mainly affecting young individuals, without any history, most often preceded by flu-like symptoms (2). In addition, MRSA producing PVL has been reported as cause of outbreak of massive abscesses, in otherwise healthy child as in kindergarten (3).

Such infection is not included in the commonly acquired infection of neonates and a prompt diagnosis

is fundamental to establish an adequate therapy. The choice of the antibiotic treatment is based on the need to inhibit the replication of *Staphylococcus aureus*, as well as, to limit the action of the PVL toxin. To reach this aim in the present case, the use of anti-*Staphylococcus* drugs (i.e. vancomycin or daptomycin) was embraced with antibiotic molecules that inhibits the protein synthesis and have demonstrated efficacy in reducing the activity of PVL toxin, such as Linezolid, Rifampicin or Clindamycin. The choice of Linezolid rather than Clindamycin came from the resistance of the strain to the latter antibiotic.

To the best of our knowledge, this is the first case of MRSA producing Panton-Valentine leukocidin sepsis reported in preterm neonate. Recently has been reported a similar case for *Staphylococcus aureus* that was not methicillin-resistant (4) with consequently different treatment strategy. Indeed, we agree with the authors of the latter report, that a whole body MRI rule out silent organ involvement, as the cavitory lung lesion in our patients that had not been noted in the chest X-ray and help clinicians to understand the real extension of disease.

In conclusion, this case reminds us to test Panton-Valentine leukocidin in a very aggressive MRSA disseminated infection also in preterm neonates to rapidly establish adequate treatment. Furthermore, this case shows the fundamental role of the anamnesis to discover the parents as the bearer of the germ and to establish a decontaminant therapy for both.

Statement of Ethics: The authors state that parents of subject have given their written informed consent to publish the case (including publication of images).

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