

Methicillin resistant *Staphylococcus aureus* as a cause of chorioamnionitis

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Summary

Background: Chorioamnionitis is a leading cause of morbidity and mortality in preterm infants. Only rarely is *Staphylococcus aureus* implicated. A case of methicillin resistant *Staphylococcus aureus* causing chorioamnionitis and endometritis is presented.

Case Report: A 39-year-old gravida 2 para 1 female, who previously worked as the unit clerk in the pediatric pulmonary unit of a children's hospital, was initially admitted at 22 weeks with a shortened cervix. The patient refused emergency cerclage. She was released from the hospital and returned at 25 4/7 weeks' estimated gestational age with possible spontaneous rupture of membranes. An amniocentesis was performed and revealed a gram stain positive for many gram positive cocci as well as a glucose of <2 mg%. The patient was started on intravenous ampicillin and gentamicin and induction of labor with oxytocin was begun. Approximately 1 day after the patients' delivery, the culture from the amniocentesis was noted to have grown methicillin resistant *Staphylococcus aureus*, and the patient's (as well as the neonate's) regimen was switched to vancomycin.

Conclusion: A Medline search revealed no cases of methicillin resistant *Staphylococcus aureus* causing chorioamnionitis. When chorioamnionitis or refractory endometritis is encountered in a patient who works in the health care industry, methicillin resistant *Staphylococcus aureus* must be considered.

Key words: Chorioamnionitis; Methicillin resistant *Staphylococcus aureus*.

Introduction

Chorioamnionitis is a leading cause of morbidity and mortality in neonates. It occurs in only 1-5% of term pregnancies but in as many as 25% of preterm deliveries [1, 2, 3]. The most common causes (across all gestational ages) are *Escherichia coli*, *Bacteroides*, *Prevotella*, group B streptococci and anaerobic streptococci. Only rarely is *Staphylococcus aureus* implicated as the causative pathogen [4, 5, 6]. No cases of methicillin resistant *Staphylococcus aureus* (MRSA) causing chorioamnionitis have been documented. We present the case of a patient found to have MRSA causing both chorioamnionitis and endometritis.

Case Report

A 39-year-old gravida 2 para 1 female was initially admitted at 22 weeks' estimated gestational age (EGA) (by second trimester ultrasonography) with an incompetent cervix. The patient had previously worked as the unit clerk in the pediatric pulmonary unit of a children's hospital, as well as in the same hospital's neonatal intensive care unit (NICU). Her cervix was dilated to 2 cm and a vaginal probe ultrasonographic cervical length was 15-20 mm with funneling and dynamic changes. No subjective or objective evidence of contractions was noted. The patient's physician consulted the Maternal Fetal Medicine service and the patient was started on intravenous ampicillin/sulbactam, intravenous magnesium sulfate, and intramuscular betamethasone with the intent of placing a cerclage if no evidence of chorioamnionitis was found. An amniocentesis was performed and a genetically normal male karyotype was found as well as no evidence of chorioamnionitis. Cerclage placement

was offered to the patient, but was refused. She was released from the hospital after a week as an inpatient and returned at 25 4/7 weeks EGA with possible spontaneous rupture of membranes. Although intact membranes were found (along with an amniotic fluid index of >15 cm), the patient had a temperature spike to 104.4 °F while being observed in the triage unit. Maternal urinalysis was negative. Maternal white blood cell count was 10,000 cells/mm³ with 88% granulocytes and no bands. An amniocentesis was performed and revealed a gram stain positive for many gram positive cocci as well as a glucose of <2 mg%. The patient was started on intravenous ampicillin and gentamicin. A thorough discussion with the patient and her husband was undertaken and then induction of labor with oxytocin was begun. Secondary to a non-reassuring fetal heart tracing a cesarean delivery was performed after another discussion with the patient and her husband. A viable male infant weighing 910 g was delivered. The infants' APGAR scores were 1 at 1 minute and 3 at 5 minutes with an arterial cord gas showing a pH of 6.99 and a pCO₂ of 62 mmHg.

The patient continued to have temperature elevations during the postoperative period. Approximately 1 day later, the culture from the amniocentesis was noted to have MRSA, and the patient's (as well as the neonate's) antibiotic regimen was switched to vancomycin. The patient defervesced within 24 hours of beginning vancomycin therapy. Blood cultures drawn prior to initiation of vancomycin therapy grew MRSA also, so the patient was treated with 14 days of intravenous vancomycin. The neonate developed a bowel perforation and was operated on for necrotizing enterocolitis.

Discussion

Chorioamnionitis is a leading cause of morbidity and mortality in neonates occurring in as many as 25% of preterm deliveries [1]. There are two presumed routes of inoculation for chorioamnionitis: ascending infection and

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hematogenous spread. Ascending infections are more common and are most often bacterial [7]. Group B Streptococcus and *E. coli* are the two most prevalent pathogens [1]. Often the pathogen is unknown prior to starting antibiotic therapy. Antibiotics are chosen to cover the most common organisms. Ampicillin and gentamicin in combination are two commonly prescribed antimicrobials. Extended spectrum penicillins and cephalosporins (i.e., ampicillin/sulbactam, ticarcillin/clavulanic acid, cefotetan, or cefoxitin) can be used as monotherapy [1, 8].

In patients with cervical incompetence in the second trimester, microbial invasion of the amniotic cavity occurs in greater than 50% of cases [9]. The most common organism isolated by Romero *et al.* in their series was *Ureaplasma urealyticum* [9]. The fact that *U. urealyticum* was isolated so frequently reinforces that a negative gram stain does not mean that chorioamnionitis is not present since this organism as well as other mycoplasma species are not apparent on a gram stain [1, 8].

S. aureus colonizes 30% of menstrual age women [10]. The most common place where *S. aureus* colonizes is the mucosal membranes of the nares where it attaches use cell wall and cell membrane teichoic acid. Although known to colonize the vagina, *S. aureus'* method of attachment to the vaginal mucosa is unknown [10].

Although the rate of community acquired MRSA is rising, MRSA colonization is still more common in people working in the health care industry [10, 11]. The process of infection can begin at anytime after colonization if the organism gains access to deeper tissue.

S. aureus is the most common cause of soft tissue infection in adults. Soft tissue infections are usually caused by a patient's endogenous flora [10]. The treatment of choice for serious infections caused by methicillin sensitive *S. aureus* is intravenous nafcillin or oxacillin. If MRSA is isolated, the mainstay of treatment is intravenous vancomycin [10, 11].

When and where the patient acquired the MRSA, which caused the chorioamnionitis, endometritis, and bacteremia, is unknown. She may have either acquired it while working in the NICU or pediatric pulmonary unit, or she may have been colonized by it while hospitalized at 22 weeks' EGA this pregnancy. The most likely route for her infection was ascension from the vagina since vaginal mucosa is a known site of possible colonization. Her therapy for this MRSA infection consisted of 14 days of intravenous vancomycin. The more difficult questions arise when one considers the patient's next pregnancy. Because of her shortened cervix with funneling (a presumptive diagnosis of incompetent cervix), the patient would be offered a McDonald's cerclage at approximately 13-14 weeks EGA. However, should the patient be offered intravenous vancomycin prior to surgery to decrease the colony count and hopefully decrease the chance of chorioamnionitis? A Medline search from January 1966 to June 1998 was carried out using the following key words: chorioamnionitis, endometritis, *Staphylococcus aureus*, and methicillin resistance. No previous cases of MRSA causing chorioamnionitis were found. Because this is the first reported case of MRSA

causing chorioamnionitis, the management of a subsequent pregnancy is unknown. In orthopedics, the use of glycopeptide antibiotics, including vancomycin and teicoplanin, as a prophylactic for surgery in institutions with high rates of MRSA has begun to be studied [12]. Mini *et al.* found that a single dose glycopeptide antibiotic was efficacious and well tolerated [12]. Whether their work applies to this patient's situation is not known.

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