



Case report

Chorioamnionitis caused by *Staphylococcus aureus* with intact membranes in a term pregnancy: A case of maternal and fetal septic shock



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ABSTRACT

Chorioamnionitis is usually caused by migration of cervicovaginal flora through the cervical canal in women with ruptured membranes. Common causative pathogens are genital mycoplasmas, anaerobes, enteric gram-negative bacilli, and group B streptococcus. There have been only seven previous reports of chorioamnionitis due to *Staphylococcus aureus* and their clinical courses are characterized by rapid disease progression and poor prognosis. This case report describes a case of acute chorioamnionitis due to *S. aureus*, which was successfully managed with immediate cesarean section and postoperative intensive care. A 22-year-old woman presented at 39 weeks' gestation with a fever and acute lower abdominal pain. Fetal heart monitoring showed fetal distress. Immediate cesarean delivery was performed under general anesthesia. A male infant weighing 2450 g was born. He had Apgar scores of 3 and 7 at 1 and 5 min, respectively. He was immediately intubated and admitted to the neonatal intensive care unit. Maternal blood culture, vaginal culture, neonatal nares, and blood and gastric fluid culture all showed methicillin-sensitive *S. aureus*. Histopathology of the placenta demonstrated focal acute funisitis and acute chorioamnionitis. Interestingly, most of the patients in the previous reports developed chorioamnionitis due to *S. aureus* despite the presence of intact membranes, as in our case. Bacterial spread in the absence of membrane rupture and the presence of bacteremia suggests hematogenous, rather than ascending, etiology of *S. aureus* chorioamnionitis.

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1. Introduction

Sepsis or septic shock during pregnancy is reported to affect 1 in 10,000 to 50,000 deliveries, and it is a major cause of morbidity and mortality [1]. The most common causative infections are septic abortion, chorioamnionitis, complicated pyelonephritis, and pneumonia caused by *Streptococcus pneumoniae* and influenza [2].

Chorioamnionitis is usually polymicrobial, and caused by migration of cervicovaginal flora through the cervical canal in women with ruptured membranes [3]. Common causative pathogens are genital mycoplasmas, anaerobes, enteric gram-negative

bacilli, and group B streptococcus [3]. There have been only seven previous reports of chorioamnionitis due to *Staphylococcus aureus* [4–10]. The clinical courses are characterized by rapid disease progression and poor prognosis. All 7 previously reported cases showed acute clinical course, and of 7 cases, only 3 succeeded to save the lives of infant. This case report describes a case of acute chorioamnionitis due to *S. aureus* which was successfully managed with immediate cesarean section and postoperative intensive care.

2. Case report

A 22-year-old woman, gravida 2, para 0, presented at 39 weeks' gestation with a fever and lower abdominal pain. The patient had been treated for candida vulvovaginitis at 38 weeks of pregnancy. Otherwise, the course of pregnancy was uncomplicated. The patient had been admitted to our hospital with premonitory pain at 39 weeks and 0 days of pregnancy. The pain disappeared

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subsequently and she was discharged on the next morning. At the time of discharge, the patient was afebrile, and vital signs were stable, with reassuring fetal status on a cardiotocogram (Fig. 1A). Two hours after discharge, she returned to our hospital with lower abdominal pain. On admission, she was in severe persistent pain. Her vital signs were as follows: pulse, 130/min; temperature, 40.5 °C; blood pressure, 94/30 mmHg; and respiratory rate, 26/min. The vulva was red and swollen. There were no signs of rupture of the membranes. An internal examination showed cervical dilatation to 2.0 cm. Transabdominal ultrasound showed a normally implanted placenta and there was no sign of placental abruption.

Fetal heart monitoring showed tachycardia at 175 beats per minute, decreased variability, and repetitive mild variable deceleration (Fig. 1B). Under a diagnosis of maternal septic shock and fetal distress, immediate cesarean delivery was performed under general anesthesia. A male neonate weighing 2450 g was born. He had Apgar scores of 3 and 7 at 1 and 5 min, respectively. The umbilical artery pH was 6.932. The neonate was immediately intubated and was admitted to the neonatal intensive care unit for neonatal sepsis and respiratory distress. The mother continued to be febrile, tachycardic, and hypotensive during the postoperative period. Ampicillin was intravenously administered during the operation and ceftriaxone 1 g every 12 h was provided postoperatively. The patient did not respond to aggressive hydration therapy and norepinephrine was started. Approximately 1 day later, a blood culture that was taken from the mother preoperatively showed growth of Gram-positive cocci in clusters (Fig. 2). The patient's antibiotic regimen was switched to doripenem and vancomycin. On day 5 postoperatively, a blood culture showed methicillin-sensitive *Staphylococcus aureus* (MSSA). The antibiotics were switched to ampicillin/sulbactam. Because she also fulfilled the disseminated intravascular coagulation criteria, anti-disseminated intravascular coagulation treatment with thrombomodulin was started. The patient gradually defervesced over the 2nd week of the hospital stay and antibiotic treatment was discontinued after 14 days. The mother and neonate were discharged in good health on the 20th hospital day.

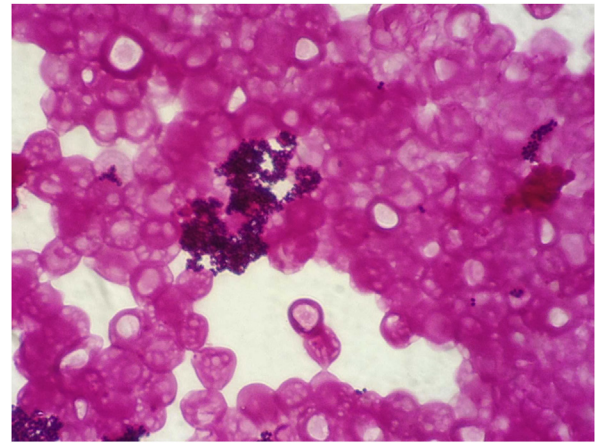


Fig. 2. Blood culture that was taken from the mother preoperatively showed growth of Gram-positive cocci in clusters.

Maternal blood culture, vaginal culture, neonatal nares, and blood and gastric fluid culture all showed MSSA. Histopathology of the placenta demonstrated focal acute funisitis and acute chorioamnionitis. Leukocytes infiltrated the villus extending into the amnion. Fibrin deposition was found in the intervillous space (Fig. 3A). Leukocytic infiltration in the umbilical vein and artery extended to the vessel walls (Fig. 3B).

3. Discussion

Chorioamnionitis is a common event, which occurs in 2–4% of pregnant women in labor [3]. There are two presumed etiologies of chorioamnionitis: ascending infection via the vagina, and the transplacental pathway. Ascending infections are more common, and especially at term, they typically occur in the setting of labor and rupture of the membranes. Uncommonly, chorioamnionitis can

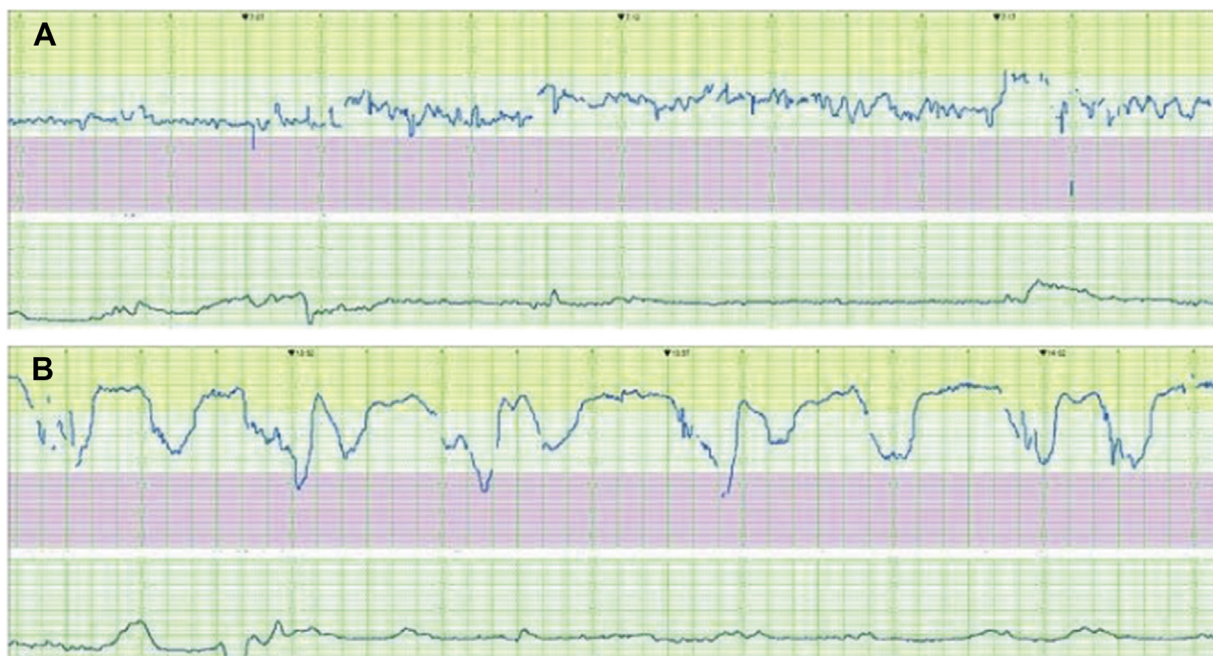


Fig. 1. A: A cardiotocogram at the time of discharge shows reassuring fetal heart rate pattern, irregular uterine contraction. B: A cardiotocogram at the time of readmission. Fetal heart monitoring showed tachycardia at 175 beats per minute, decreased variability, and repetitive mild variable deceleration.

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