



Figure 1. Case 1. Chest computed tomography. Rupture is observed in the pars membranacea of the right membranous-cartilaginous junction in the distal third of the trachea, indicated by an arrow.

itate the procedure, minimize the number of intubation attempts, limit the risk of iatrogenesis, and protect personnel performing the technique (Fig. 1).

The exceptional conditions of both patients, primarily the lack of respiratory reserve that ruled out single-lung ventilation and right thoracotomy, guided our decision to use the tracheal approach (transcervical-transmanubrial). In both cases, the lesions could be successfully repaired without using ECMO, unlike the cases published by Abou-Arab et al.⁸ Procedures were performed with intermittent ventilation through the tube, orotracheal in the first case, and via the tracheotomy in the second case, using ventilatory pauses to safely perform tracheal sutures.

To minimize the risk of aerosols, the patient was maintained in complete muscle relaxation throughout the procedure; preoxygenation and ventilatory pauses—apneas—were performed (as far as possible) in accordance with the recommendations described for tracheotomy.^{5,6}

In the absence of specific recommendations, we believe that the risks associated with ECMO did not justify its use to limit the risk of contagion. But for the absence of active ventilation, the airway would also have been kept open during repair and complete muscle relaxation would have been equally necessary.

We believe that our ventilatory management and the consequent reduction of aerosol generation, along with the use of PPE for all personnel involved, dramatically reduced the risk of contagion.

Conflictos de intereses: ninguno.

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Early-onset *Streptococcus pneumoniae*-induced neonatal sepsis[☆]



Sepsis neonatal precoz por *Streptococcus pneumoniae*

To the Editor,

Streptococcus pneumoniae (*S. pneumoniae*) has a high morbidity rate in the pediatric population and causes a wide range of diseases such as otitis media, pneumonia, sepsis, or meningitis.^{1,2} However,

infections caused by this microorganism in the neonatal period only account for 1%–11.5% of neonatal sepsis.^{3–5} Nevertheless, a recent study using molecular techniques (PCR) as well as blood cultures to study pathogens causing neonatal sepsis seems to indicate that the incidence may be higher (up to 18%).⁶ Mortality from *S. pneumoniae* among neonates is high (35%–50%)^{2–5} and long-term neurological sequelae are common.⁵

We report the clinical case of a neonate with early-onset *S. pneumoniae* sepsis caused by vertical transmission.

The patient was a full-term newborn boy (39 weeks of gestational age) with high birth weight (3820 g). The mother had a monitored, incident-free pregnancy, except for *Candida albicans*

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infection in the third trimester that was properly treated, and an episode of sinusitis at week 37, for which she received a 1-week course of amoxicillin-clavulanate. Serologies performed during pregnancy and culture of vaginorectal exudate were negative. Gestational ultrasound showed mild bilateral pyelectasis. Delivery was normal and no resuscitation maneuvers were required. Apgar score was 10/10 and umbilical arterial pH 7.25.

During the first day of life, the patient developed poor oral tolerance and intermittent expiratory grunt (Silverman score 2), with no other signs of respiratory distress. Laboratory tests requested at 8 h of life were normal, and after performing blood culture the patient remained under observation. At 24 h of life when the infant was already asymptomatic, the microbiology department reported isolation of *S. pneumoniae* in blood culture. Therefore, laboratory tests were repeated, showing leukocytosis ($32,500/\text{mm}^3$) with no left shift, and raised CRP (5 mg/dl). The patient was admitted and the early neonatal sepsis protocol was initiated, with a lumbar puncture which did not present any alterations, and empirical intravenous treatment with ampicillin and gentamicin was started, the latter being discontinued when the result of the susceptibility testing was received.

Given the results of the culture, sputum samples and urinary antigen samples were taken from both parents, and a sample of vaginal exudate from the mother. Pneumococcal antigen in urine was also studied in the patient's 4-year-old brother. In the family study, a positive result was obtained in the vaginal exudate of the mother, supporting the hypothesis of vertical transmission of the patient's sepsis.

Pneumococcal typing was performed in the patient and mother, revealing a 19A serotype in both cases.

Clinical progress was good and the patient remained stable and without requiring respiratory support, so after completing 7 days of antibiotic therapy, he was discharged home. The mother remained asymptomatic throughout the patient's admission.

Since the first case of *S. pneumoniae* neonatal sepsis was published in 1889,² this disease has scarcely appeared in the literature, given its low prevalence. There are more than 90 serotypes, the most common in neonatal sepsis being 3 and 19.⁴ In other studies, more serotypes have been defined as common etiological agents in addition to those mentioned above (serotypes 1–12, 14, 17, 23, 27, 28, 31 and 39).²

Neonatal sepsis caused by *S. pneumoniae* has two routes of transmission. On the one hand, it may be due to vertical transmission, either at the end of pregnancy or intrapartum, caused by vaginal colonization. We should not forget that *S. pneumoniae* is a common microorganism in the respiratory tract, but very rare in the vaginal flora (<0.75%)^{1,2} due to its difficulty surviving the low pH of the vagina; this explains the reduced prevalence of neonatal sepsis due to this etiology. On the other hand, transmission may be horizontal, caused by infection of the neonate by close contacts with acute *S. pneumoniae* infection.^{1,3}

Several studies have found that factors such as prematurity, low weight, and prolonged rupture of membranes do not increase the risk of developing *S. pneumoniae* sepsis.^{2,4} An increased risk of infection has been observed in normal deliveries compared to cesarean deliveries and in women who have undergone invasive gynecological procedures. The use of intrauterine devices for contraception also increases the incidence of vaginal colonization.^{2,5}

There are no differences in clinical symptoms with respect to sepsis due to other etiologies. In the case of *S. pneumoniae*, up to 40% of neonatal sepsis are early-onset,^{2,5} which is suggestive of vertical disease transmission. Mortality is higher in cases occurring in the first 48 h or when the mother has an invasive pneumococcal disease.²

Neonatal pneumococcal sepsis usually presents with an aggressive course, so early appropriate treatment is important. Most strains of *S. pneumoniae* are sensitive to penicillin or ampicillin, so one of these antibiotics should be used.^{2,4} In areas with a high prevalence of penicillin resistance, vancomycin should be added to the regimen.⁵

Pneumococcal vaccination has led to a decrease in diseases caused by this microorganism in the population.¹ Vaccination during pregnancy increases the production of IgG antibodies, which are transmitted to the fetus through the placenta, with elevated levels observed in children up to 2 months of life.² It also produces an increase in IgA antibodies in breast milk and reduces vaginal colonization.⁵ The use of the pneumococcal vaccine in the third trimester may be a useful measure in the future to reduce cases of neonatal sepsis, but further studies are needed to confirm the usefulness of this approach.¹

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