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ORIGINAL ARTICLE

Sensitivity of histological chorioaminionitis and premature rupture of membranes for neonatal sepsis and its risk factors

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KEYWORDS
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Abstract
Objectives: Set the sensitivity of the histopathological diagnosis of chorioamnionitis (CAMH) for early diagnosis of neonatal sepsis and the relationship between histological chorioamnionitis and premature rupture of membranes and neonatal sepsis.
Materials and methods: Prospective, observational study and diagnostic test performed in the Neonatology Service of the ''Dr. José Eleuterio González'' University Hospital. Epidemiological variables were collected from mothers and newborns. The relationship between histological chorioamnionitis with premature rupture of membranes and early neonatal sepsis was established.
Results: We recorded 3694 births. Of these, 122 patients were studied as potentially infected, of whom 37 patients were excluded (2 by transfer to another hospital and 35 by not finding a histopathological study of the placenta). The study included 85 newborns. Of these, 43 (50.5%) developed clinical and laboratory data of early neonatal sepsis, the rest ($n = 42$, 49.5%) were healthy newborns. The sensitivity of histological chorioamnionitis with premature rupture of membranes (PRM) of more than 24 h was 81% for neonatal sepsis and 51% without. The risk factors for neonatal sepsis were: Mother with infection ($p < 0.001$), weight <1500 g (<0.001), gestational age <28 weeks (<0.05), APGAR score <6 in 5 min ($p < 0.05$).
Conclusions: Placental chorioamnionitis with premature rupture of membranes > 24 h has an 81% sensitivity for neonatal sepsis. A newborn with histological chorioamnionitis has a 51% sensitivity for neonatal sepsis.

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Introduction

Chorioamnionitis (CAM) is the inflammation of the amniochorionic membrane and the most frequent cause of premature delivery. Chorioamnionitis can be *clinically* defined based on maternal symptoms which include fever, abdominal pain, abnormal vaginal flow and leukocytosis. It can also be *histologically* defined with evidence of inflammation and necrosis in the entire chorionic plate and amnion. Chorioamnionitis is linked to significant maternal and neonatal morbidity and mortality rates.[1–11] It often occurs through an ascending and multi-bacterial infection. CAM can cause fetal inflammatory response syndrome, which brings along greater risks of periventricular leukomalacia (PVL), cerebral palsy and chronic pulmonary disease.[12–15] The objective of this study was to correlate histological chorioamnionitis sensitivity with neonatal sepsis and premature rupture of membranes (PRM).

Materials and methods

An observational, prospective study and a diagnostic test were conducted at the neonatal service of the ''Dr. Jose E. Gonzalez'' University Hospital of the Autonomous University of Nuevo León, from August 1st, 2012 to July 31st, 2013. This study was accepted by the institution's Ethics Committee with the folio no. NE12-002.

The study included those patients admitted to the Neonatal Intermediate and Intensive Care Units with a diagnosis of potentially infected, with a history of premature rupture of membranes with 18 h of evolution or longer, maternal fever, warm and/or fetid uterine cavity, and a histopathological study of the placenta. On the other hand, we excluded potentially infected newborns born in a different hospital and, lastly, we eliminated patients who did not have a histopathological study of the placenta.

The sample was made by convenience and included the potentially infected patients. After looking at in-hospital clinical evolution the patients were divided into two groups for analytical comparison: the first group included patients with neonatal sepsis and the second group was a control group which included healthy patients.

Studied variables

Maternal history

Maternal age, divided into, <18 years old, 19–30 years old and >30 years old; health, subdivided into healthy mothers and history of threatened abortion, premature delivery, infections, preeclampsia, eclampsia, gestational diabetes, chorioamnionitis, antepartum hemorrhages and premature rupture of membranes, with a subdivision of time intervals of: 18–24 h, 25–48 h, 49–72 h and >72 h.

Variables of newborns

Weight at birth in grams, divided into <1000, 1000–1500, 1501–2500, 2501–4000 and >4000; gestational age in weeks according to the following intervals: <28 weeks, 28–33 weeks, 34–36 weeks, 37–42 and >42 weeks. Trophism according to a percentile in weight divided into; adequate for gestational age, small for gestational age and large for gestational age; male or female, and APGAR score at 5 min divided as follows: 0–3 points, 4–6 points and 7–10 points.

Qualitative variables were used in the statistical analysis. Hypothesis tests were the following: chi square test (non-parametric), an alpha value of 0.05 was used and the null hypothesis was rejected when the critical value was less than 0.05. For those variables representing statistically significant numbers, the odds ratios were obtained, and when they were based on a confidence interval of 95%, risk factors supporting the alternative hypothesis and protective factors were obtained. Sensitivity and specificity were obtained, as well as positive and negative predictive values using a 2×2 contingency table where the predictive or ''independent'' variable was the premature rupture of membranes and the outcome or ''dependent'' variable was neonatal sepsis.

Sensitivity and specificity were obtained, as well as positive and negative predictive values using chorioamnionitis with sepsis as a predictive variable and the ruptured sac >24 h as another dependent variable.

Results

There were 3694 births in the studied period. Of these, 122 patients were studied as potentially infected. 37 patients were excluded (2 because they were moved to a different hospital and 35 because they did not have the histopathological study of the placenta). In the end, the studied sample was 85 newborns. Out of these, 50.5% ($n = 43$) developed clinical and laboratory data of early neonatal sepsis, the rest 49.5% ($n = 42$) were reported as healthy.

When comparing *maternal history* in both groups (neonatal sepsis vs. healthy) the findings were the following: maternal age of the study groups was the same, with the highest number of mothers in the 19–35 years old group. Regarding maternal health during pregnancy, mothers of the neonatal sepsis group had a higher morbidity $p < 0.001$, among which infections standout (23% vs. 4.7%) $p < 0.05$. The rest of the diseases registered without a significant number. Regarding ruptured sac time, in both groups, the highest percentage was found in rupture over 72 h, in the statistical analysis, both groups were the same. In prenatal care, both groups were similar, with 86% of the patients in the neonatal sepsis group and 90.4% in the healthy group (Table 1).

Newborns' characteristics

When comparing weight at birth, most patients with sepsis weighed under 2500 g (<0.05). Regarding age groups, the <28 weeks group had 20.9% of newborns with sepsis and 2.3% of the healthy ones ($p < 0.01$). We identified the largest group in the 28–33 weeks interval, with 51.1% of the patients with sepsis and 30.9% of the healthy ones, a non-significant number compared with the group of 34–36 weeks with 9.3% septic patients and 45.2% healthy ones ($p < 0.001$); gestational ages of 37–42 and more weeks were without significant numbers. Regarding trophism, the largest number corresponded to an adequate weight for gestational age in both groups (62.7% and 76.1%, septic and healthy