



Early postnatal diagnosis of congenital syphilis: contribution of a comparative Western Blot method



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INTRODUCTION AND PURPOSE

The effectiveness of serological testing and treatment in preventing mother-to-child-transmission of syphilis is well-recognized. In 2007, WHO launched its Initiative for the Global Elimination of Congenital Syphilis, with the goal that by 2015 at least 90% of pregnant women are tested for syphilis and at least 90% of seropositive pregnant women receive adequate treatment. Despite that huge effort, CS persists as a public health problem. Due to the frequent absence of specific signs of infection at birth, serology has a pivotal role in CS diagnosis: all infants born to mothers with reactive syphilis tests should be tested in parallel with their own mothers.

The aim of the present study was to improve the early serological diagnosis of children at risk of CS, by assessing the diagnostic value of a comparative IgG Western Blot (WB) method finalized to match IgG immunological profiles of the mothers and their own babies at birth, in order to differentiate between passively transmitted maternal antibodies and antibodies synthesized by the infants against *Treponema pallidum*.

To this purpose, sera obtained from thirty mother-infant pairs at birth, collected during a time period of seven years, were analyzed by a comparative "in-house" IgG WB assay for *T. pallidum*. All the women had been found positive by treponemal and non-treponemal tests at delivery and they had received inadequate treatment for syphilis. The results were retrospectively compared to those obtained by testing infants' sera at birth or during their follow-up.

METHODS

Study group. We evaluated 30 infants born to mothers found infected during their pregnancies or at delivery. All the enrolled babies were born between January 2007 and May 2014, at St. Orsola-Malpighi Hospital, Bologna, Italy and they underwent follow-up for at least 12 months to establish if the maternal infection had been vertically transmitted.

Serological analysis at birth and during the follow-up period. Architect Syphilis TP (Abbott), a chemiluminescent microparticle immunoassay (CMIA), TPHA and RPR (Randox) were performed on mother/child pairs' serum specimens. Titers ≥ 80 were considered positive for TPHA testing.

In addition, IgM WB tests were performed on neonatal sera and they were considered positive when at least two of the four bands corresponding to Tp47, TmpA, Tp17, and Tp15 were clearly recognized, including at least one with low molecular mass.

Retrospective analysis by comparative IgG WB. An in-house IgG WB assay was performed on mother/child pairs' serum specimens. In particular, the serum sample collected from the infant and the one collected from infant's mother were incubated independently on adjoining strips and run in parallel.

For the evaluation of the results obtained by comparative IgG WB, a double step procedure was followed. First, all of the strips were examined in order to decide if they fulfilled IgG positivity criteria for WB method (presence of at least three bands out of Tp47, TmpA, Tp17 and Tp15). Only after this first evaluation, we moved to the second step.

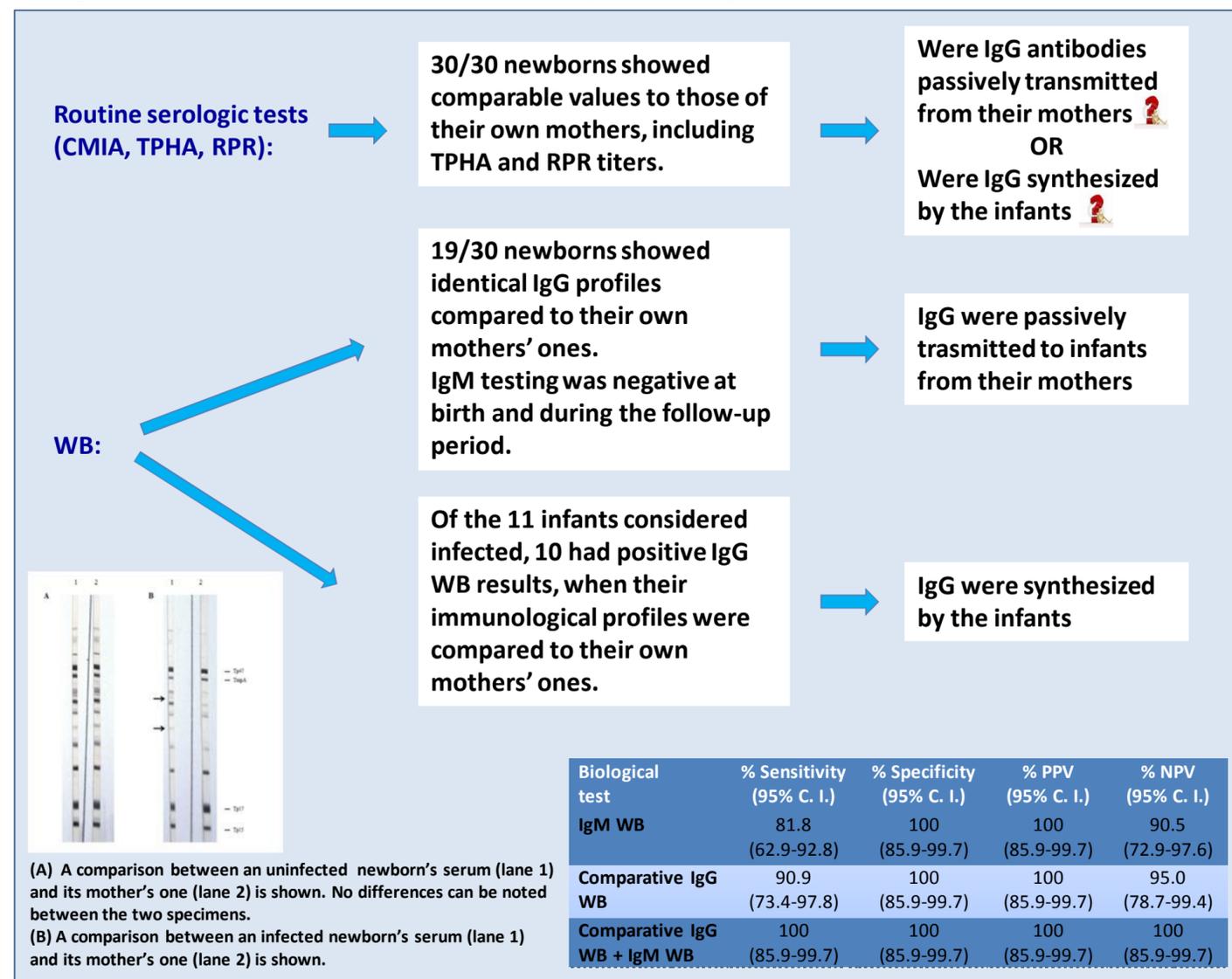
The infant's IgG WB was considered indicative of a congenital infection if at least one additional band of any molecular weight was present in neonatal serum but absent in the maternal one.

Each additional band was interpreted as the synthesis of specific anti *T. pallidum* neo-antibody produced by the neonate and not as a passive transfer of immunoglobulins across the placenta.

RESULTS

Eleven out of the 30 enrolled newborns were diagnosed as highly probable congenital syphilis cases: 9/11 infants received the definitive diagnosis with the first week of life, whereas the remaining 2 were diagnosed only later, because of increasing serological tests titers.

In contrast, the use of the comparative WB testing performed with mother/child pairs' serum specimens during the retrospective study allowed a correct diagnosis of congenital syphilis in 10/11 cases



CONCLUSIONS

The comparative IgG WB test is a welcome addition to the conventional laboratory methods used for the diagnosis of CS at birth, since it allows to identify high-risk infants and to promptly and adequately treat them, avoiding unnecessary therapy and the consequent hospitalization of uninfected infants.