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A Relevance of Serological Tests in Diagnosis of Early Congenital Syphilis: A Case Report

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Abstract Congenital syphilis is acquired by an infant from an infected mother by transplacental transmission of *Treponema pallidum* during pregnancy or possibly at birth from contact with maternal lesions. Early form of congenital syphilis is when the clinical manifestations occur before two years of age and late congenital syphilis is when manifestations occur among untreated patients after two years of age. Serological tests hold a mainstay in syphilis diagnosis. Nontreponemal tests are commonly used as a screening test for syphilis, which may turn negative after full course of treatment, while treponemal tests are diagnostic and remain positive for life in low titre even after treatment. Here, we present a case of early congenital syphilis and its confirmation with serological tests with emphasis on the relevance of these tests in confirmation of diagnosis.

Keywords Congenital, Early, Syphilis, Serology

1. Introduction

Congenital syphilis, caused by *Treponema pallidum*, has been recognized since the 15thcentury. Syphilis as a congenital infection is a worldwide public health problem especially in developing countries [1].

World Health Organization (WHO) estimates that two million pregnant women get infected with syphilis, every year. Without adequate treatment many of them transmit this infection to their offspring, thus increasing the number of reported cases of stillborn, preterm, low birth weight, or congenital infection [2].

Untreated syphilis during pregnancy has a transmission rate nearing 100%. Fetal or perinatal death occurs in 40% of affected infants [3]. At birth, Most of the affected infants are asymptomatic, but two-thirds develop symptoms in 3-8 weeks [4].

Congenital syphilis is a rare and serious disease that although preventable continues to be a major health care problem [5]. Serological tests hold a mainstay in syphilis diagnosis. Here, we report a case of early congenital syphilis in a newborn infant with emphasis on relevance of serological tests in confirming the diagnosis.

2. Case Report

We received the sample of 27 yr old female, mother of 5 week old male child for RPR (Rapid plasma regain) test. On performing the test on serum, the result was reactive with 1:8 dilutions. We asked for the husbands sample for RPR test to rule out STD (Sexually transmitted disease). On performing the test on neat serum and also with prozone phenomenon, the result was non reactive. He was advised for TPHA test (Treponema pallidum hemagglutination assay) which turned out to be reactive with 1:80 dilutions.

On tracing the history we came to know that the above screened parents have admitted their 5 week old baby with complain of abdominal swelling since 1 week, bilateral scrotal swelling which relieves on micturation, peeling of skin and running nose. The child was clinically suspected of early congenital syphilis. Treatment was started with intravenous Crystalline Penicillin G for 10 days.

Baby's sample was tested for RPR test. On performing the test the result was reactive with 1:128 dilutions, in correlation; TPHA was reactive with 1:2560 dilutions. CSF VDRL (Veneral Disease Research Laboratory) was negative. He was delivered as full term normal vaginal delivery. The mother had uneventful antenatal period, but on tracing the record, the status of VDRL/RPR test done during antenatal checkup could not be retrieved.

3. Discussion

Congenital syphilis is acquired by an infant from an infected mother by transplacental transmission of *T. pallidum* during pregnancy or possibly at birth from contact with maternal lesions [6].

Early form of congenital syphilis is when the clinical manifestations occur before two years of age and late

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congenital syphilis is when manifestations occur after two years of age among untreated patients [7]. General clinical manifestations seen in infants at birth or within the first 4–8 weeks of age are hepatosplenomegaly, snuffles, lymphadenopathy, mucucutaneous lesions, pneumonia, edema, rash, haemolytic anemia, or thrombocytopenia [8].

The laboratory methods for diagnosis of early syphilis are dark-field examination and direct fluorescent antibody tests from lesion or tissues. However, a rapid diagnosis is possible with the use of serologic tests: the nontreponemal tests [VDRL and RPR] and the treponemal tests [TP-HA and FTA-ABS (fluorescent treponemal antibody absorption)] [9].

Syphilis is a treatable condition as *T. pallidum* is sensitive to penicillin. VDRL and RPR, nontreponemal tests, are commonly used as a screening test for syphilis, which may turn negative after full course of treatment. These tests have the high sensitivity and specificity in primary and secondary syphilis while least in late latent syphilis [10, 11, 12]. The titre of $\geq$ 1:8 is considered as significant titre for VDRL or RPR test.

Treponemal tests like TPHA and FTA-ABS are diagnostic and remain positive for life in low titre even after treatment. In our case, the father had a negative RPR test but positive TPHA (with low titre of 1:80) indicated either a latent syphilis or recovery on treatment [13].

Father's sample was also tested for prozone phenomenon. Prozone phenomenon is an immunological event, relying on an antigen-antibody interaction as seen in RPR or VDRL. An agglutination or precipitation reaction will be positive (i.e., visible through lattice formation) depending on several factors that determine the size and solubility of the immune complex formed *in vitro*. The optimal ratio of the antigen antibody yields an insoluble precipitate that is visible, thus rendering the test positive. The prozone phenomenon refers to a false negative response resulting from overwhelming antibody titers. Published reports document the incidence of prozone phenomenon to be between 0.2 and 2% in syphilis. This is performed by diluting the patient's serum to bring the antibody concentration into the zone of equivalence. Therefore, it is important to notify the laboratory to test for prozone phenomenon, when the clinical findings strongly suggest syphilis and when the nontreponemal serological test results are negative [14].

For definitive diagnosis of congenital syphillis, the Centers for Disease Control (CDC) recommends identification of syphilis in the mother; lack of evidence of adequate maternal treatment; presence of clinical, laboratory or radiological evidence of syphilis in the infant; and comparison of maternal and infant non-treponemal serologic titers using the same test and preferably the same laboratory [15]. Here, we used the RPR test to screen both mother and child.

An RPR titre in the infant that is four fold higher than that of the mother strongly suggests the congenital syphilis [16, 17, 18]. In our case RPR titre in infant was 128, which was four fold higher, while mother's titre was 8.

As per WHO guidelines, all pregnant women should be screened for syphilis in the first antenatal visit in the first trimester and again in the late pregnancy [19]. A study by P. Lumbiganon et al also support the recommendation, that in addition to the initial testing, a second routine test for syphilis ought to be established early in the third trimester even in low-prevalence areas [20]. Congenital syphilis is a totally preventable disease; however, it continues to be a serious healthcare problem in the 21stcentury, especially in developing countries [21, 22].

Hence, to reduce the incidence of congenital syphilis we would like to emphasize the value of serological tests used for screening mothers prenatally, and at delivery. An adequate follow up is also critical and only a substantial effort can make congenital syphilis a tragedy of past.

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