LETTER TO THE EDITOR

The Role of Early Amniotomy and The Risk of Vertical Transmission of Hepatitis B Virus

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DISCLOSURE
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Hepatitis B virus infection is a known public health issue and is associated with high mortality globally; with over 700,000 deaths yearly.[1] It is one of the medical conditions that can cause chronic infection with grave consequences such as liver cirrhosis and hepatocellular carcinoma in over 240 million people worldwide.[1] The prevalence of hepatitis B virus infection is highest in sub-Saharan Africa and East Asia, where approximately 10% of the adult population is clinically infected.[1] In Nigeria, the risk of transmission was estimated to be 53.3% and 4.6% in South-South and South-East zones, respectively.[2,3] Vertical transmissions, otherwise known as maternal to child transmission, is known to be the most common route of spread of this virus in highly endemic areas with increased disease burden (90 %) in exposed mothers and less than 40% for HBsAg positive and HBcAg negative mothers.[4] Foetal infections usually result in chronic liver disease and eventually lead to mortality in those who do not receive immune-prophylaxis.

Despite this increased risk of transmission from mother to child during pregnancy, labour or postpartum period, Hepatitis B infections are highly preventable. The risk of transmission during pregnancy is minimal but highest during labour and in postpartum period when it can be as high as 90%.[5]

Vertical transmission of HBV is usually confirmed by a positive hepatitis B surface antigen (HBsAg) or positive HBV-DNA; it results in an infant born to an infected mother and presents several challenges to the mother, child and health worker.[4]

Transmission during pregnancy occurs in 2 major ways: breaking of the placental barrier

through trans-placental migration into the foetus and through trans-placental blood leakage into the foetal circulation. This second mechanism often results from prolonged threatened preterm labour, threatened miscarriage or due to increased uterine contractions.[5] Transmission during labour is significant and currently regarded as the most important because it also enhances horizontal transmission if precautionary measures are not taken.[6]

The risk factors implicated in vertical transmission include: increased viral load (HBV DNA greater than 10^6 IU/ml), presence of high levels of HBcAg (90-95% risk), non-use of immune- prophylaxis after delivery, foetal swallowing of infective fluids, severe nausea and vomiting during pregnancy, labour lasting for more than 9 hours, multi-parity and increased number of multiple sexual partners prior to pregnancy.[5,6]

As a preventable infection, the World Health Organization has designed an effective preventive measure to reduce vertical transmission, the single most important precaution being the administration of immune prophylaxis using hepatitis B immunoglobulin and active hepatitis B vaccine within 12 hours of delivery. In addition, two more doses will be given at one and six months of age.[1] This prophylaxis prevents transmission during labour and in the postpartum period, granting 100% protection among mothers with viral load less than 150pg/ml. However, the possibility of failure exists (5-10 % of exposed infants still get infected) and has been attributed to the in-utero transmission that occurs prior to onset of labour.[6]

Considering the strategic role of the peripartum period in transmission of the disease, several interventions have been utilized as part of prophylactic efforts. The use of antiviral prophylaxis has been tried in the past with inconclusive results; therefore, none is currently recommended. Tenofovir was found in a retrospective study to be very effective in reducing in utero transmission.[11] It had neither obstetric complications nor birth defect effects. However, it is not recommended because no randomized controlled study has assessed its efficacy in this respect.

Periodic administration of Hepatitis B immunoglobulin during pregnancy had a protective effect in its trial but the study was limited by its small sample size.[7] The effects of caesarean and vaginal delivery have been investigated in the past with conflicting results. A study in China showed that the risk of transmission when caesarean section was conducted compared to vaginal delivery was 3% vs 6.8%, respectively.[8]

However, a meta-analysis of four randomized controlled trials involving 789 pregnant women showed that caesarean section (before labour or rupture of membranes) was associated with a lower rate of transmission (10.5%) compared with vaginal delivery (28%).[3] Despite the apparent benefit of caesarean section in the study above, the researchers did not recommend its use in preference to vaginal delivery because of low quality of evidence and complications associated with caesarean section.

Amniotomy is a commonly used obstetric intervention used to shorten the process of labour; it involves the instrumental rupture of placental membranes which leads to the release of various substances including hormones that promote uterine contraction and cervical dilatation.[4] Not many authors have studied the influence of this procedure on vertical transmission of HBV. However,

preliminary data does not support its routine use in labour management as there is risk of uterine hyper stimulation and foetal heart rate abnormalities.[5]

Some studies suggest that invasive procedures do not appear to increase the risk of vertical transmission, however, these studies have failed to address the potential impact of viral load and have been limited by small number of participants.[6,7] Other researchers also point out that knowledge of the mother's hepatitis B e antigen status may be valuable in counselling women about the risks associated with invasive procedures during pregnancy. [7]

No association between amniocentesis and vertical transmission was found in a case-control study of 51 infected children which evaluated risk factors for vertical transmission or in a case series of 22 HCV-positive women who underwent amniocentesis. This has led some maternal health experts to the conclusion that obstetric care providers should avoid internal foetal monitoring, prolonged rupture of membranes, and episiotomy in managing labour in hepatitis virus positive women.[10]

The rate of neonatal hepatitis B infection attributable to amniocentesis ranges from up to 1.4% in new-born of mothers positive for hepatitis B surface antigen to as high as 16% among mothers with a positive hepatitis B e antigen status.[8]

Although there is no statistically significant difference between the rates of infection in neonates exposed to amniocentesis and those not exposed to amniocentesis in these two maternal populations, knowledge of the mother's hepatitis B e antigen status may be valuable in counselling women about the risks associated with amniocentesis. Amniocentesis in women infected with hepatitis C does not appear to significantly increase the risk of vertical transmission, but women should be counselled that very few studies have properly addressed this possibility and that more research on this topic is required.

Most invasive procedures such as amniotomy are performed with care to avoid a transplacental approach and all the infants of these pregnancies receive hepatitis B vaccination and immune-prophylaxis commencing at birth. The overall rate of vertical transmission in a study by the Gagnon was 2.9%.[9] This rate of immune-prophylaxis failure was consistent with rates seen in women who have not undergone amniocentesis.[10]

Amniocentesis does not appear to increase the risk of vertical transmission, although this conclusion is based on limited data.[9] Moreover, these studies have not addressed the potential impact of viral load and have been limited by small sample sizes. Several factors in labour management may be associated with an increased risk of vertical transmission of HCV, namely prolonged rupture of membranes, internal foetal monitoring and episiotomy. One study reported that membrane rupture of greater than 6 hours was associated with increased risk of vertical transmission;[10] and another by Spencer *et al*. revealed that the median duration of membrane rupture was significantly longer among women who transmitted HCV to their infants than among those who did not (28 vs 16 hours).[9]

Regarding invasive foetal monitoring, a retrospective study including 710 HCV-infected women and a prospective study including 242 HCV-infected women both reported that internal foetal monitoring was associated with increased risk of

transmission compared with no internal monitoring.[9,10]

It is also worthy of note that the usual timing for amniotomy and amniocentesis differ, the former usually in the first trimester for diagnostic purposes and the latter during labour. This suggests that the dynamics of blood borne disease transmission may differ during both procedures. Will risk of HBV transmission be greater during a procedure carried out much earlier in pregnancy or will the absence of an intact membrane be more significant during the few hours it takes to expel the foetus? These questions further expose the fact that definitive comparism of risk cannot be made due to the scarcity of evidence.

Conclusion

There is no evidence from available studies to suggest any benefits of amniotomy in preventing vertical transmission of HBV. On the contrary, although the procedure should reduce the intra partum interval, prolonged labour (lasting for more than 9 hours) when amniotomy and similar invasive practices are carried out increases the chances of HBV transmission There is an obvious lack of evidence to completely determine the impact of peri-natal invasive procedures on the risk of vertical transmission in women with blood borne diseases especially hepatitis B.

We recommend that obstetric care providers avoid internal foetal monitoring, prolonged rupture of membranes, and episiotomy in managing labour in Hepatitis positive women, unless it is unavoidable in the course of management. Expectant management of ruptured membranes should be avoided at term and patients with ruptured membranes at term should be actively managed in labour.

Non-invasive methods of prenatal risk screening such as serum screening combined with or without nuchal translucency, and anatomic ultrasound that provide the highest sensitivity with the lowest false-positive rate are recommended in order to minimize the number of amniotomies carried out in labour.

We also recommend that further studies be carried out in large numbers of women to fully understand the benefits and risks associated with the practice in order to enable health care workers make the best decisions on behalf of the women and children who face the risks associated with pregnancy, childbirth and the puerperium. This is even more essential in developing countries where the practice remains common and risk perception is lower.

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ERRATUM

We wish to correct the error in an author's name in the article, 'Effectiveness of the Ponseti Technique in the Management of Clubfoot' published in volume 31 issue 3-4 July-December, 2019 edition. The correct author name is Chibuzo U Ndukwu and not Christopher C Ndukwu. The correct citation should be: Henry O Obiegbu, Chibuzo U Ndukwu, Titus O Chukwuanukwu. Effectiveness of the Ponseti Technique in the Management of Clubfoot. Orient Journal of Medicine 2019:31(1-2);89-93