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HIV-positive Women's Placental Pathology

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Perspective

Recognizing the importance of placental characteristics and functions can provide information on maternal health, the uterine environment during pregnancy, birth outcomes, and newborn health. There have been significant advances in preventing HIV transmission from mother to child in the setting of HIV and Antiretroviral Therapy (ART). However, there is currently a scarcity of data on the influence of HIV/ART on placental pathology, and the studies that do exist focus on specific patterns of placental injury, emphasising the need for a more defined and comprehensive approach to the differential diagnosis of HIV/ART-exposed placentae. The goal of this study is to compile information from separate studies on patterns of placental harm in HIV/ART patients HIV and/or ART have been associated to placental harm, including maternal vascular malperfusion and acute and chronic inflammation, in both pre- and post-ART eras. These patterns of injury are also related to adverse birth outcomes, such as premature birth, and current research reveals a link between poor placental function and foetal growth. With the growing number of HIV-positive pregnant women on antiretroviral therapy (ART), there is an urgent need to fully incorporate placental diagnoses into obstetric illness classification. It's also crucial to consider essential aspects of the mother's medical history. Finally, in order to gain more insight into the explanation of HIV/ART-related placental harm, it is necessary to standardise the reporting of placental pathology.

The human placenta is a well-organized, highly specialised organ that aids in the normal growth and development of the foetus and serves as the only link between a woman and her unborn child. The placenta and trophoblast-mediated invasion of the decidua begin roughly six days after fertilisation as the newly formed embryo undergoes implantation, and the placenta and membranes are fully developed by the 12^{th} to 13^{th} week of pregnancy. The organ continues to grow and mature in the weeks after birth, until it is expelled. Recognizing the significance of placental characteristics and their distinct functions might provide essential information about the uterine environment during pregnancy.

Maternal infections during pregnancy have been shown to affect placental and foetal development, as well as pregnancy outcomes and newborn health. HIV, in particular, causes significant immunological dysregulation, which includes chronic inflammation and immune activation. Antiretroviral therapy (ART) is not affected by pregnancy when it comes to limiting HIV progression. People living with HIV, on the other hand, are more likely to contract opportunistic diseases, sexually transmitted infections, and vertically transmissible viruses like Hepatitis B and C. The classic group of perinatal infections, TORCH: toxoplasmosis, other (syphilis), rubella, cytomegalovirus, and herpes simplex, include opportunistic infections such as toxoplasmosis, other (syphilis), rubella, cytomegalovirus, and herpes simplex, some of which may present mildly in the mother but have serious consequences for the foetus. There is a lot of emphasis on pre-conception HIV testing and prompt ART initiation for HIV-positive women. Prompt ART initiation at conception is suggested for women starting ART throughout pregnancy.

According to UNAIDS estimates, 85 percent of the almost 1.3 million pregnant women living with HIV in 2019 had access to antiretroviral therapy (ART). Since the Pediatric AIDS Clinical Trials Group (ACTG) 076 trial, which led to the rapid adoption of Zidovudine (ZDV) monotherapy administered antenatally and intrapartum, and the World Health Organization (WHO) recommended treatment approaches, Options A, B, and B+, ART regimens for prevention of mother-to-child transmission (PMTCT) have evolved significantly. The WHO Options A and B were initially given out based on immunological and/or clinical criteria. Option A: Women with CD4 counts less than 350 cells/mm^3 were started on triple ART as soon as they were diagnosed and continued for the rest of their lives; those with CD4 counts greater than 350 cells/mm^3 were started on ZDV monotherapy as early as 14 weeks gestation, given a single dose of Nevirapine (NVP) at the onset of labour, and then given Zidovudine-Lamivudine (ZDV-3TC) for 7 days postpartum. Women with CD4 counts less than 350 cells/mm^3 were started on triple ART as soon as they were diagnosed and continued for the rest of their lives, while those with CD4 counts greater than 350 cells/mm^3 were started on triple ART as early as 14 weeks gestation, continued intrapartum and through childbirth if not breastfeeding, or up to 1 week after cessation of all breast feeding. Although combination ART with Tenofovir Disoproxil Fumarate (TDF) and ZDV-based regimens was more effective than ZDV monotherapy for PMTCT, evidence from The Promoting Maternal and Infant Survival Everywhere (PROMISE) trial showed that combination ART with TDF and ZDV-based regimens was associated with higher rates of very preterm birth (PTB), stillbirth, and early infant death. This begs the question: what effect do HIV and/or ART have on the placenta's growth, development, and optimal functioning, perhaps causing harm to the foetus?

Placentas exposed to HIV/ART show signs of increased inflammation, notably acute chorioamnionitis in ART-naive women, vascular disruption, and placental insufficiency, with placental weights that are modest for gestational age. Preterm birth (PTB), foetal growth restriction (FGR), and foetal death are all linked to changes in placental development. Some evidence suggests that the use of protease inhibitor (PI)-based regimens is linked to placental damage, which has been linked to lower progesterone levels, poor decidualization, and spiral artery remodelling. Pregnant women with HIV (PWH) on Efavirenz (EFV) or NVP-based ART have been diagnosed with placental damage, including maternal vascular malperfusion in placentae. Despite the dramatic reduction in the risk of HIV transmission in utero due to the global success of PMTCT programmes, the results of placenta pathology investigations related to HIV and/or ART exposure are presented here. This study shows that ART has definite benefits for both the mother and the child, but it is not without hazards. We show how the risk of MVM is twice as high in women who start ART before getting pregnant. Furthermore, ACA, the most commonly documented histological diagnosis in PWH placentae, is more common in ART-naive women than with those on ART. Despite this, research linking placental characteristics to clinical history, neonatal outcomes, and infant follow-up is lacking.

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