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Scheduled Cesarean Delivery and the Prevention of Vertical Transmission of HIV Infection

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Prevention of transmission of the human immunodeficiency virus (HIV) from mother to fetus or newborn (vertical transmission) is a major goal in the care of pregnant women infected with HIV. An important advance in this regard was the demonstration that treatment of the mother with zidovudine (ZDV) during pregnancy and labor and of the neonate for the first 6 weeks after birth could reduce the transmission rate from 25% to 8% (1).

Continuing research into vertical transmission of HIV suggests that a substantial number of cases occur as the result of fetal exposure to the virus during labor and delivery; the precise mechanisms are not known. Transmission could occur by transplacental maternal–fetal microtransfusion of blood contaminated with the virus during uterine contractions or by exposure to the virus in maternal cervicovaginal secretions and blood at delivery. Data also indicate that the risk of vertical transmission is proportional to the concentration of virus in maternal plasma (viral load). At very low concentrations of virus in maternal plasma (viral load less than 1,000 copies per milliliter), the observed incidence of vertical transmission among 141 mother–infant pairs was 0 with a 95% upper confidence bound of about 2% (2, 3).

In theory, the risk of vertical transmission in mothers with high viral loads could be reduced by performing cesarean deliveries before the onset of labor and before rupture of membranes (termed *scheduled cesarean delivery* in this document). Early studies of the relationship between the mode of delivery and the risk of vertical transmission yielded inconsistent results. Data from two prospective cohort studies (4, 5), an international randomized trial (6), and a meta-analysis of individual patient data from 15 prospective cohort studies, including more than 7,800 mother–child pairs (7), indicate that there is a significant relationship between the mode of delivery and vertical transmission of HIV. This body of evidence, accumulated mostly before the use of highly active antiretroviral therapy (HAART) and without any data regarding maternal viral load, indicates that scheduled cesarean delivery reduces the likelihood of vertical transmission of HIV compared with either unscheduled cesarean delivery or vaginal delivery. This finding holds true whether or not the patient is receiving ZDV therapy. Whether cesarean deliv-

ery offers any benefit to women on HAART or to women with low or undetectable maternal viral loads is unknown. Data are insufficient to address the question of how long after the onset of labor or rupture of membranes the benefit is lost. It is clear that maternal morbidity is greater with cesarean delivery than with vaginal delivery, as is true for women not infected with HIV (8–10). Increases in postpartum morbidity seem to be greatest among women infected with HIV who have low CD4 cell counts (9).

Although many issues remain unresolved because of insufficient data, there is consensus that the following should be recommended:

- Patients should be counseled that in the absence of antiretroviral therapy, the risk of vertical transmission is approximately 25%. With ZDV therapy, the risk is reduced to 5–8%. When care includes both ZDV therapy and scheduled cesarean delivery, the risk is approximately 2%. A similar risk of 2% or less is seen among women with viral loads of less than 1,000 copies per milliliter, even without the systematic use of scheduled cesarean delivery. No combination of therapies can guarantee that a newborn will not become infected (a 0% transmission rate).
- Women infected with HIV, whose viral loads are greater than 1,000 copies per milliliter, should be counseled regarding the potential benefit of scheduled cesarean delivery to further reduce the risk of vertical transmission of HIV beyond that achievable with antiretroviral therapy alone.
- Neonates of women at highest risk for vertical transmission, with relatively high plasma viral loads, are most likely to benefit from scheduled cesarean delivery. Data are insufficient to demonstrate a benefit for neonates of women with plasma viral loads of less than 1,000 copies per milliliter. The available data indicate no reduction in the transmission rate if cesarean delivery is performed after the onset of labor or rupture of membranes. The decision regarding the route of delivery must be individualized in these circumstances.
- The patient's autonomy in making the decision regarding route of delivery must be respected. A patient's informed decision to undergo vaginal delivery must be honored, with cesarean delivery performed only for other accepted indications and with patient consent.
- Patients should receive antiretroviral chemotherapy during pregnancy according to currently accepted guidelines for adults (11). This should not be interrupted around the time of cesarean delivery. For those patients receiving ZDV, adequate levels

of the drug in the blood should be achieved if the infusion is begun 3 hours preoperatively (1), according to the dosing schedule recommended by the Centers for Disease Control and Prevention (www.cdc.gov/hiv/treatment.htm).

- Because morbidity is increased in HIV-infected women undergoing cesarean delivery, physicians should consider using prophylactic antibiotics during all such cesarean deliveries.
- The American College of Obstetricians and Gynecologists generally recommends that scheduled cesarean deliveries not be performed before 39 completed weeks of gestation. In women with HIV infection, however, delivery at 38 completed weeks of gestation is recommended to reduce the likelihood of onset of labor or rupture of membranes before delivery.
- Best clinical estimates of gestational age should be used for planning cesarean delivery. Amniocentesis to determine fetal lung maturity in pregnant women infected with HIV should be avoided whenever possible.
- Current recommendations for adults indicate that plasma viral load should be determined at baseline and then every 3 months or following changes in therapy (11). Plasma viral load should be monitored, according to these guidelines, during pregnancy as well. The patient's most recently determined viral load should be used to direct counseling regarding mode of delivery.
- Preoperative maternal health status affects the degree of risk of maternal morbidity associated with cesarean delivery. All women should be clearly informed of the risks associated with cesarean delivery. Ultimately, the decision to perform a cesarean delivery must be individualized in each case according to circumstances.

A skin-penetrating injury (eg, needlestick or scalpel laceration) is a risk to care providers during all deliveries, vaginal or cesarean. This risk is not greater during cesarean delivery, although there generally are more health care personnel present and, thus, at risk during a cesarean delivery than during a vaginal delivery (12). Appropriate care and precautions against such injuries always should be taken, but these concerns should not affect decisions regarding route of delivery (13).

In summary, cesarean delivery performed before the onset of labor and before rupture of membranes effectively reduces the risk of vertical transmission of HIV infection. Scheduled cesarean delivery should be discussed and recommended for women with viral

loads greater than 1,000 copies per milliliter whether or not they are taking antiretroviral therapy. As with all complex clinical decisions, the choice of delivery must be individualized. Discussion of the option of scheduled cesarean delivery should begin as early as possible in pregnancy with every pregnant woman with HIV infection to give her an adequate opportunity to consider the choice and plan for the procedure. The risks, which are greater for the mother, must be balanced with the benefits expected for the neonate. The patient's autonomy must be respected when making the decision to perform a cesarean delivery, because the potential for maternal morbidity is significant.

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