

Anesthetic Considerations for the HIV-Infected Pregnant Patient

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It has been reported that women of childbearing age constitute a large percentage of the new cases of HIV/AIDS infection. Consequently, it is not uncommon to find pregnant women who are HIV positive. Because of the increased prevalence of HIV infection in pregnant women, many anesthesiologists encounter these patients in their practices. Infection with HIV in pregnancy often raises questions about the safety of regional anesthesia in these patients. This controversy first began when it was suggested that the introduction of a spinal needle in an HIV-infected parturient would spread the disease into the CNS, leading to the development of neurological sequelae of this disease. Nevertheless, recent analysis of the problem has shown HIV infection should not contraindicate regional anesthesia.

Key Words: HIV infection, acquired immunodeficiency syndrome (AIDS), pregnancy, obstetric anesthesia, regional, general

INTRODUCTION

Infection with Human Immunodeficiency Virus (HIV) has been described as a "disease that knows no borders and respects no moral code".^{1,2} Because of the increased prevalence of infection with HIV in pregnant women, many obstetric anesthesiologists are seeing these patients in their practices and must grapple with the question: Can regional anesthesia be safely performed in the parturient that is HIV-positive? In order to answer this question, and to be more familiar with the obstetric and anesthetic management of these

women, this review will update and familiarize the anesthesiologist with the effect that this disease, and the drugs used for its treatment have on both the mother and her developing fetus. Anesthetic options for these patients will be reviewed with a focus on the use of neuraxial techniques. In addition, HIV infection passing from patient to physician can occur, and therefore safety measures that can be taken when handling body fluids or blood will also be reviewed.

IDENTIFICATION OF PREGNANT PATIENTS WITH HIV-INFECTION

Identification of HIV in the pregnant patient is of significant importance to obstetricians, neonatologists and anesthesiologists.³ It is unfortunate that only about 20% of physicians inquire about substance abuse when interviewing their patients. It can be presumed that even fewer inquire about the possibility of HIV infection.⁴

The diagnosis of HIV infection in pregnancy often raises questions about the safety of regional anesthesia and analgesia in these patients. This controversy began when the introduction of a spinal needle was suggested to increase patient's risk for the development of the neurological sequelae of this disease.⁵ Despite this fear, it has now been well established that HIV infection does not contraindicate the administration of neuraxial anesthesia.⁶ HIV is a neurotropic virus, and the central nervous system is infected early in the course of the disease process.^{6,7} These findings have been confirmed by the isolation of virions and antibodies in the cerebrospinal fluid (CSF). Neurotropic predisposition to an HIV virus is

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responsible for the clinical evidence of neurological dysfunction at the time of AIDS diagnosis in up to 30 to 40% of infected patients.⁷

Human Immunodeficiency Virus is a retrovirus that carries enzyme reverse transcriptase, which converts the single-stranded viral RNA into double-stranded DNA. The double-stranded DNA may be subsequently integrated into the DNA material of the infected human cells. AIDS has grown from negligible numbers in 1980 to a cumulative total of 8.4 million cases, as reported by the World Health Organization, as of 1997.⁸ As of December 2002, the World Health Organization reported that a total number of adults and children living with HIV/AIDS had reached 42 million individuals.² It has been estimated that with the onset of the new millennium, 90% of new AIDS cases will be found in the Third World countries. Recreational drug abuse and homosexual orientation appear closely related to most, but not all European and American AIDS patients.⁹ In most parts of Africa, heterosexual intercourse still remains the dominant mode of HIV transmission. In the United States, women have been identified as the fastest growing group of new AIDS patients.¹⁰ For example, in the United States in 1996, HIV infection was reported to be the leading cause of death in black women, and the third

leading cause of death for all women in the 25- to 44-year-old age group.¹¹

HIV/AIDS should be viewed as a clinical spectrum that may affect any system of the human body, - it is a multi-system disease. The clinical manifestations of HIV/AIDS are reviewed in Table 1.¹²⁻¹⁸ This disease usually begins with a primary infection, followed by a period of clinical latency of variable length, leading to profound immunodeficiency, opportunistic infection and death. In some countries (e.g. USA), the HIV-positive patient, irrespective of her clinical condition, meets, by definition, the criteria for AIDS when the CD4+T cell count drops below 200 cells/microliter.¹⁹ Diagnostic confirmation of the disease relies on the detection of antibodies to HIV antigens. It may take up to 10 to 12 weeks from the initial infection before the antibodies in human serum reach those of needed to confirm an HIV infection, which remains one of the major problems facing our society today. This disease has crossed international, geographic, economic and social borders. Pregnant women, unfortunately, are not immune to this disease, and in fact, women of childbearing age constitute a large percentage of new cases at detectable levels (window period). Two well-established diagnostic tests for HIV are based on antibody detection, which in-

Table 1. Clinical Manifestations of HIV/AIDS

System	Clinical manifestations
Nervous system	Myelopathy, aseptic meningitis, HIV encephalopathy, dementia complex, peripheral neuropathy, autonomic neuropathy
Pulmonary system	Opportunistic infections (pneumocystis carinii, mycobacterium tuberculosis, mycobacterium avium complex)
Cardiovascular system	Pericardial disease, dilated cardiomyopathy
Gastrointestinal system	Oropharyngeal candidiasis, aphthous ulcers, leukoplakia, esophagitis, hepatobiliary involvement, HIV enteropathy with chronic diarrhea
Renal system	Focal and segmental glomerulosclerosis, end-stage renal failure
Hematological system	Normocytic normochromic anemia, thrombocytopenia, neutropenia, coagulation abnormalities
Endocrine system	Adrenal insufficiency, hypothyroidism, SIADH
Immunological system	Depression of immune function
Musculoskeletal system	AIDS-related wasting syndrome

clude the enzyme-linked immunosorbent assay (ELISA) and the Western blot test. The ELISA test measures the binding of anti-HIV antibodies from a patient's serum to a mixture of antigens obtained from HIV that have been grown either in human tissue culture (first-generation test) or through recombinant DNA techniques (second-generation test). To confirm the diagnosis after a positive ELISA result, a Western blot test is usually performed, as a false positive result with the Western blot test occur less frequently than with ELISA.²⁰

TREATMENT OF HIV-INFECTED PREGNANT PATIENTS

Most currently used drug regimens for the treatment of HIV infected patients include three-drug protocols, combining a protease, or non-nucleoside reverse transcriptase, inhibitor, with two nucleoside reverse transcriptase inhibitors. As more complex treatment modalities become available, the clinical picture of HIV-infected patients may become more challenging for health care providers. Pregnant women should, in general, receive the same therapy as they would if not pregnant, taking into account the metabolic differences, concerns regarding specific drugs and additional indications for therapy, to

prevent perinatal transmission.²¹ The physiological changes during pregnancy that may impact the pharmacokinetics of antiretroviral drugs include; increased plasma volume, cardiac output, glomerular filtration rate, decreased plasma proteins for binding of drugs and changes in the metabolic enzyme levels. The commonly used drugs, and their anesthetic implications, are reviewed in Table 2.²²⁻²⁴

PREVENTION OF PERIPARTUM TRANSMISSION OF HIV-INFECTION

A high maternal viral load increases the likelihood of perinatal transmission of HIV,^{25,26} and evidence suggests that most perinatal HIV transmissions occur during labor and delivery.^{27,28} Mock et al.²⁷ conducted a prospective cohort study of 218 formula-fed infants of untreated HIV-infected mothers with a known infection outcome and a birth HIV-1 positive DNA PCR. Of the 49 infected infants in their study, 12 (24.5%) were presumed to have been infected in utero, and 37 (75.5%) infected intrapartum. The estimated absolute overall transmission rate was 22.5% (5.5% in utero transmission rate and 18% intrapartum transmission rate). Low birth weight was associated with in utero transmission, whereas low maternal natural killer cell and CD4+T-lympho-

Table 2. Anesthetic Implications of Anti-retroviral Drug Therapy

Drug	Anesthetic implications
Zidovudine	Thrombocytopenia
Ganciclovir	Neutropenia
Trimethoprim Sulfamethoxazole/	Neutropenia
Didanosine	Peripheral neuropathies
Stavudine	Peripheral neuropathies
Zalcitabine	Peripheral neuropathies
Lamivudine	Peripheral neuropathies
Protease inhibitors	Abnormal electrolyte levels
Isoniazid	Thrombocytopenia
Rifampin	Thrombocytopenia
Ethambutol	Hepatic dysfunction
Pentamodine	Bronchospasm, arrhythmias, electrolyte abnormalities
Phenytoin	Hepatic dysfunction, thrombocytopenia

cyte percentages were associated with intrapartum transmission. Kind et al.²⁹ studied the effect of elective cesarean section and zidovudine prophylaxis on vertical HIV transmission. In their cohort study, 67 out of 414 newborns were found to be infected, producing an overall transmission rate of 16.2%. An elective cesarean section, with intact membranes, but without previous labor, was associated with the lower transmission rate of 6%. The transmission rate was intermediate after a spontaneous delivery or nonelective cesarean section (18%), but higher after obstetric interventions (27%). In this study, the combined use of an elective cesarean section and zidovudine resulted in a 0% transmission rate (none out of 31), compared with 8% (seven out of 86) after an elective cesarean section without zidovudine, and 17% (four out of 24) after zidovudine alone and 20% (55 out of 271) after no intervention. The authors concluded that an elective cesarean section and zidovudine prophylaxis appear to have an additive effect in the prevention of vertical HIV transmission. Because of these recent findings, many HIV-positive women are being advised to undergo an elective cesarean section, and anesthesiologists will be expected to take a more active role in their management.

ANESTHETIC CONSIDERATIONS FOR HIV-INFECTED PREGNANT PATIENTS

HIV is a neurotropic virus, and CNS invasion occurs in the early stages of primary infection. Therefore, neuraxial anesthetic techniques may be safely used in many HIV-infected patients for analgesia during labor, with a cesarean section not accelerating the progression of HIV to the central nervous system.⁶ Anesthetic management of an abdominal delivery must be tailored to the individual obstetric indications, the urgency of delivery and the presence of any coexisting disease. HIV seropositivity alone, however, should not determine the preferred method of anesthesia for a cesarean section or analgesia for labor.³⁰ The fact that a parturient has been diagnosed as HIV-positive should not cause a physician to deny appropriate care, and the American Medical Association has suggested that physicians have an

ethical duty to treat HIV-positive patients.

A significant number of HIV-infected patients have a past medical/social history that has in some way contributed to infection with HIV. Substance abuse (intravenous drug abuse in particular) remains a significant risk factor, and may have anesthetic implications. Sexually transmitted diseases, such as hepatitis B and syphilis, may also alter the anesthetic management. A careful physical examination, and documentation of neurological deficits, should therefore be undertaken before the induction of regional anesthesia.^{31,32} The presence of AIDS-related dementia may preclude the patient consenting to either surgery or anesthesia. Involvement of the respiratory system with an oropharyngeal and esophageal pathology may make these patients more prone to regurgitation, difficult intubation and aspiration. Opportunistic pulmonary infections may necessitate prolonged postoperative mechanical ventilation. A careful examination of the cardiovascular (subclinical cardiomyopathy) and renal systems (nephropathy), as well as hematological studies (neutropenia, thrombocytopenia), are indicated as part of the anesthetic preoperative assessment. Although thrombocytopenia may occur in the HIV-positive patient, it is rare for the platelet count to be low enough as to impact on the choice of anesthetic. If, however, the platelet count falls below 50,000, the risks of bleeding and the development of epidural hematoma increase, and the use of alternative anesthetic techniques should be considered on a case-by-case basis. There appears to be no evidence of increased infectious complications in parturients that receive neuraxial anesthesia or analgesia.

Treatment for the complications of neuraxial anesthesia, including the management of a post-dural puncture headache, should not differ from the management of HIV-negative parturients. Specifically, should a post-dural puncture headache occur, an epidural blood patch, with autologous blood, is safe and effective in HIV seropositive patients.³³ If general anesthesia is selected, dose adjustments for a history of drug abuse, compromised liver and kidney functions or generalized muscle wasting, may be necessary. In addition, HIV-related lung pathology may require the use of a higher fraction of intraoperative in-

spired oxygen. An increased sensitivity to opioids and benzodiazepines may occur, particularly in patients with HIV associated mental changes.

OCCUPATIONAL EXPOSURE

Necessary safety measures (universal/standard precautions) must be employed when handling blood, blood products, body fluids and tissues from all patients. Because there is a "window period" between the primary HIV infection and seroconversion, the diagnosis can be delayed. Additionally, the transmission of other blood borne pathogens, such as hepatitis B and C, must also be considered. The use of gloves prevents 98% of an anesthesiologist's contact with a patient's blood and body fluids.³⁴⁻³⁶ Facemasks and eye-shields further reduce the risk of exposure, and should be routinely used. The risk of HIV transmission from a needle-stick injury, with HIV-infected blood, is approximately 0.32%.³⁷ All health workers with needle stick injuries should have immediate access to antiretroviral drug therapy. Drugs should be taken within the first hour following exposure, which can reduce the rate of seroconversion by 80%.³⁸ Factors determining the risk of exposure of health-care workers include: the quantity of blood involved, the type of procedure for which the needle was used, the depth of the needle-stick injury and the viral titers of the HIV-infected patient.

SUMMARY

Regional anesthesia has become a paramount technique for the relief of pain during labor and delivery, and a hallmark of modern obstetric anesthesia practice. Can every HIV-positive patient safely receive spinal or epidural anesthesia? Obviously not. The decision to administer neuraxial analgesia or anesthesia should be individualized, and made only after review of the history (including coexisting diseases), a physical examination and appropriate laboratory tests. However, as demonstrated in this review, the vast majority of parturients with HIV positivity and AIDS can safely receive neuraxial blocks. When

considering the optimal anesthetic to administer to an HIV-positive patient, the anesthesiologist must consider not only the patient and her disease, but also the available alternatives. As with all pregnant patients, the consequences of administering a general anesthetic to a stable parturient with HIV may include failed intubation and aspiration.

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