ANAESTHETIC CONSIDERATIONS FOR THE HIV POSITIVE PARTURIENT

***Adesina Oluwabukola and **Oladokun Adesina**

*Department of Medicine, University College Hospital, Ibadan.
**Department of Obstetrics & Ggynaecology, College of Medicine, University of Ibadan, Nigeria.

Correspondence
Dr. Adesina, Oluwabukola
Dept. of Medicine,
University College Hospital, Ibadan
e-mail: bukiadewole@yahoo.com,
bukiadewole@hotmail.com
Phone No: +234-803-348-6836

ABSTRACT

The HIV epidemic in children parallels that among women on account of perinatal transmission. A combination of antiretroviral therapy and elective caesarean section reduces the rate of vertical transmission to <2%. Elective caesarean section independent of antiretroviral therapy decreases the risk of HIV vertical transmission from mother to baby. However, a caesarean section is a major surgical intervention that has well-reported complications. Women infected with HIV have been reported to be more susceptible to such complications. The multi-organ nature of HIV poses challenges at the time of surgery and anesthesia. Preoperative evaluation will allow a good prediction for the perioperative risk of the HIV-patient. The anesthesiologist should be aware of the possible toxic side effects or the possible interaction of antiretroviral drugs with the anesthetics. Some of these adverse effects may mimic signs and symptoms of the HIV disease itself. Regional anesthesia has been shown to be associated with reduced morbidity and mortality in a wide range of patients, including HIV positive parturients. Finally, the possibility of transmission in the health care setting highlights the need for anesthetists to enforce rigorous infection control policies to protect themselves, other health workers and their patients.

Keywords: HIV, anesthesia, parturient

INTRODUCTION

The global HIV epidemic continues to expand with an estimated three million people newly infected in 2007.[1] Over the decades, the epidemic, once dominated by infected males, has become increasingly feminized. In sub-Saharan Africa, where about two-thirds of the global disease burden resides, 57% of adults living with HIV are women.[2] As more women contract the virus, the number of children infected from their mothers has been growing worldwide. The epidemic in children parallels that among women on account of perinatal transmission. Indeed, an estimated 370,000 children acquired HIV in 2007 alone, with more than 90% of the infections occurring through mother-to-child transmission.[1]

A combination of antiretroviral therapy and elective caesarean sections reduces the rate of vertical transmission to <2%.[3, 4] Elective cesarean section independent of antiretroviral therapy decreases the risk of HIV vertical transmission from mother to baby.[5, 6] Indeed when viral loads are more than 1000 copies per milliliter, the benefit from elective caesarean delivery is beyond that achieved by antiretroviral therapy alone.[6] However, a caesarean section is a major surgical intervention that has well-reported complications. There is a higher incidence of morbidity after caesarean section compared with vaginal childbirth in healthy women and routine delivery by caesarean section maybe potentially dangerous in low resource settings.[6] Women infected with HIV have been reported to be more susceptible to such complications which include prolonged hospital stays and increased infective complications compared with HIV- negative women.[7] It has been suggested that the higher complication rate may be related to an impaired immune response. The incidence of complications is significantly increased when the CD4+ count is <200/ml. [8]

Anesthetic considerations

HIV is a multi-organ disease which may be complicated either by opportunistic infections, tumors, substance abuse, or antiretroviral therapeutic drugs, which all can have an impact on anesthesia. It poses challenges at the time of surgery, anesthesia and for those involved in obstetric management. During preoperative evaluation, assessment of risk should focus on the patient's immunological and clinical status, type of surgery and anesthesia. and the coexistence of opportunistic infections and malignancies. This will allow a good prediction for the perioperative risk of the HIV-patient to be constructed.[9] The history should include evaluation of concurrent treatments with

antiretroviral or anti-opportunistic drugs. The laboratory work up should include complete blood count, clotting functions, glucose, liver and renal functions test. Verification of the immunological status i.e. the CD4+ lymphocyte cell count and viral load during the previous 3 months is important.[9] Chest radiograph and electrocardiogram should be performed in all patients. Patients with a history or signs of cardiac or pulmonary dysfunction should undergo a more thorough evaluation (blood gases, echocardiography etc). One must remember that these patients have often been subjected to cardiotoxic antiretroviral drugs, may be in a hypercoagulable state, may have accelerated coronary arteriosclerosis, and often have decreased left ventricular contractility.[10,11,12]

Factors that need to be considered when administering general anesthesia include the possible effects of anesthesia and opioids on the immune system, the pulmonary and neurologic status of the HIV patient, and possible interactions with anti-HIV medications. Laboratory data suggest a detrimental effect of opioids on immune function.[9, 13] However, the clinical significance of short term opioid administration during general anesthesia is unclear and there are not enough clinical data available to justify its avoidance.[9] Several studies indicate that general anesthesia and oxidants may have a negative effect on immune function. Although this immune-suppressive effect is probably of little clinical importance in healthy individuals, the implications for the HIV- infected patient are unknown.[14, 15] Immune suppression resulting from general anaesthetics occurs within fifteen minutes of induction and may persist for as long as three to eleven days. [15, 16] Postoperative immunosuppression may last longer in inherently immunosuppressed patients and may predispose to the development of postoperative infections or facilitate tumour growth of metastasis.[16]

Before administration of any anesthetics, the anesthesiologist should be aware of the possible toxic side effects or to the possible interaction of antiretroviral drugs with the anesthetics. Some of these adverse effects may mimic signs and symptoms of the HIV disease itself.[9] During pregnancy, dosing must be taken into consideration as blood volume and volume of distribution changes during pregnancy. In addition, there are potential toxic drug effects on the fetus and the newborn.[17, 18] Side effects may also result from drugs used for prevention or treatment of opportunistic infections. For example, neuropathy or myopathy may dictate change of anesthetic techniques. Anemia and thrombocytopenia are major toxic side effects of zidovudine (a nucleoside reverse transcriptase inhibitor). Protease inhibitors can affect glucose metabolism. Foscarnet (an antiviral phosphonic acid derivative) and protease inhibitors can cause renal toxicity. Foscarnet can also alter calcium and magnesium balance.[9] Other side effects include increased liver enzymes (trimethoprim-sulfamethoxazole), broncho-spasm (aerosolized pentamidine), and ventricular arrhythmias (intravenous pentamidine).[9]

Protease inhibitors such as ritonavir, are inhibitors of CYP450, which impair the metabolism of multiple anesthetics and analgesics, such as midazolam and fentanyl, and cardiac drugs, such as amiodarone and quinidine.[9, 19]. Nevirapine is an inducer of CYP450, and therefore increasing doses of anesthetic drugs may be required in patients receiving the drugs. [9, 20] Etomidate, atracurium, remifentanil and desflurane are not dependent on CYP450 hepatic metabolism, and therefore, are preferable drugs.[9] The complications associated with the use of sucinylcholine, such as hyperkalemia or hyperpyrexia, are only a potential risk to be considered in the HIV patient with progressive neuropathy, myopathy, and muscle wasting. No such complication in HIV patient has been reported in the literature; hence the use of succinylcholine is not absolutely contraindicated.[9,21].

The presence of neurologic manifestations, such as overt dementia, may increase brain sensitivity to sedative or psychoactive drugs (opioids, benzodiazepines, and neuroleptics).[9] Opportunistic infections e.g. toxoplasmosis may be associated with increased intracranial pressure. Because these infections respond rapidly to medical therapy, surgery should be postponed whenever possible when they are present. Increased ICP and CNS infections (meningitis, encephalopathy, or myelopathy) are contraindications to neuraxial anesthesia.[22] Pulmonary complications can occur as a consequence of opportunistic infections. This may lead to respiratory distress and hypoxemia, aggravated by a decrease in functional residual capacity seen during pregnancy. Regional anesthesia may be a preferable technique in these patients.[9] Indeed, an increase in postoperative morbidity and mortality after general anesthesia compared with regional anesthesia has been reported. The stress response to surgery may be more profound after general anesthesia, which in turn may lead to impaired immune function.[23]

Regional anesthesia has been shown to be associated with reduced morbidity and mortality in a wide range of patients, including HIV positive parturients having cesarean delivery under spinal anesthesia.[23] Regional anesthesia has the advantage of not interfering with the immune system or with antiretroviral drugs. Contraindications to regional anesthesia in these patients are sepsis and platelet abnormalities. The presence of neuropathy may reduce the appeal of regional

anesthesia but there are no data to contradict its use.[9] It's use in HIV treated parturients who underwent CS has not been associated with increased peri-operative complications or changes in immune function or viral load.[23, 24]

Postdural puncture headache may occur after regional anesthesia and may necessitate epidural blood patch. There is no evidence to contraindicate the use of the patch in HIV-positive patients. Its use in HIV treated parturients who underwent CS had not been associated with peri-operative complications or changes in immune function or viral load.[25] In addition, central nervous system involvement occurs early during the course of HIV infection and introduction of HIV virus into a previously virus-free CNS after penetration of a subarachnoid space during spinal anesthesia is not really a concern.[26] However, the small numbers reported in studies may justify a conservative management as a first choice. [27] Overall, the risk with regional anesthesia is lower than if general anesthesia with prolonged artificial ventilation were administered.[23, 28]

HIV Transmission in the Health Care Setting.

Contamination of anesthetic equipment is a potential route of HIV transmission. Although, airway devices are not reused between patients, other anesthetic equipment can potentially become contaminated by patients' secretions. Contamination of laryngoscope blades and handles with visible and occult blood occurs frequently. In one study, 65 laryngoscope blades and handles identified as ready for patient use were examined, and 26 (40%) were contaminated with occult blood. [29] Heat and moisture exchange filters effectively filter bacteria and viruses thereby minimizing the risk of contamination of respiratory equipment.[30] If a hydrophobic filter is used with each patient, the use of a disposable respiratory circuit is not required.[31] Techniques such as the use of a common syringe with anesthetic drugs for several patients are a potential hazard and are not acceptable practice.[32]

HIV can be transmitted from the infected patient to the care provider as a result of exposure to infected body fluids. Deep subcutaneous or intramuscular exposure to a blood-contaminated needle from a patient with high HIV viraemia appears to be the worst type of contact.[33, 34] Most contaminated percutaneous injuries occur during multistep procedures, during recapping of needles or when contaminated sharps are not discarded safely.[35] Double gloving during surgery prevents perforations of the inner glove, but its effect on infections is unknown.[36, 37] It is recommended that double gloves are used routinely in all surgical procedures in view of the significantly higher protection it provides. Preventive efforts can reduce the risk of exposure, but not eliminate them, and comprehensive guidelines to this end have been published.[38] Following an accident with high – risk body fluid postexposure prophylaxis (PEP) is recommended to commence as soon as possible after the injury, ideally within 1-2 h.[34]

The risk of transmission from anesthetist to patient appears to be low.[38] Using the risks of transmission and the rates of percutaneous injuries, estimates have been made regarding the risk of an infected health care worker transmitting blood borne pathogens to patients. The estimated probability of transmission from an infected surgeon to a patient during a single procedure is 0.00024-0.0024% for HIV and 0.024-0.24% for HBV if the surgeon is positive for Hepatitis B e antigen (HBeAg). The estimated probability of transmission to at least one patient during 3,500 procedures (estimated to be performed during an HIV-infected surgeon's remaining working life) is 0.81-8.1% for HIV; 57-100% for HBV if the surgeon is an HBeAg carrier. These estimates represent population averages and may not necessarily apply to a particular procedure performed by a particular surgeon, for which the risk may be considerably lower or higher than the estimated average.

CONCLUSION

Anesthetists should be familiar with the overall risk of anesthesia and surgery in the HIV positive parturient. In addition, an understanding of the impact of HIV on anesthesia and the possible drug-drug interactions may help to guide the choice of anesthetic techniques. Finally, the possibility of transmission in the health care setting highlights the need for anesthetists to enforce rigorous infection control policies to protect themselves, other health workers and their patients.

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