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Review Article

Evidence-Based Guideline on Perioperative Anesthesia Management of Patients with Human Immune Deficiency Virus in Resource-Limited Areas, a Systematic Review, 2022

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ABSTRACT

Background: The World Health Organization (WHO) defines a case of Human Immunodeficiency Virus (HIV) as any individual infected with HIV, regardless of clinical stage. Those people affected with HIV/AIDS who undergo surgery are especially vulnerable. Numerous patients have opportunistic respiratory infections, which can complicate anesthesia; HIV/AIDS patients also recover more slowly and have greater difficulty breathing after surgery.

Method: Numerous ongoing controversies in the management of HIV/AIDS patients undergoing surgery are addressed by new recommendations and updates. During the development of an evidence-based recommendation or guideline, the question that it seeks to answer is explicitly defined. After establishing eligibility criteria for the evidence to be used and selecting the best papers from which to collect evidence, the evidence is gathered.

Discussion: It is necessary to inquire about and record AIDS-related conditions such as cardiomyopathy, pulmonary complications, peripheral neuropathy, medications, and episodes of bleeding. ART should be continued in the period preceding surgery, particularly in patients with a high viral load. Using parenteral zidovudine and enfuvirtide drug formulations or *via* NG tube, ART can reduce viral load during the perioperative period, increasing the safety of the procedure and decreasing the incidence of operative complications in HIV/AIDS patients.

Conclusion: HIV/AIDS is a systemic disease that affects the majority of human body systems, such as perioperative anesthesia management, perioperative morbidity, and mortality rate. Consequently, this patient group must be closely monitored using the critical management techniques outlined in this and related papers.

Keywords: HIV; Perioperative patient optimization; HIV and anesthesia; Surgery; Immunodeficiency disease

INTRODUCTION

A case of Human Immunodeficiency Virus (HIV) is defined by the World Health Organization as a person with HIV infection, regardless of clinical stage, as determined by laboratory criteria. AIDS is also present, a clinical diagnosis for any stage 4 conditions [1]. Ethiopia has a high HIV/AIDS burden despite a substantial expansion of comprehensive HIV/AIDS interventions. In 2016, there were an estimated 36,990 new HIV infections, 670,906 cases of prevalent HIV, and 19,999 HIV-related deaths [2].

HIV/AIDS was a fatal disease when it first appeared, but antiretroviral therapy has transformed HIV infection into a chronic, treatable, and well-managed condition [3]. Because 20 to 25 percent of HIV positive patients will need surgery while they are ill, it is critical to consider the challenges that HIV patients present for surgery and anesthesia [4].

Patients with HIV/AIDS who are undergoing surgery are particularly vulnerable. Many patients have opportunistic respiratory infections, which can cause complications during anesthesia. HIV/AIDS patients have more difficulty breathing after surgery and heal at a slower rate [5].

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The prevalence of HIV/AIDS among surgical patients at UOGCSH is 12.1%, rising to 25.7% among those with infectious surgical illnesses such as appendicitis and cholecystitis. Morbidity and mortality were higher in patients thought to have developed AIDS [6,7].

While CD4 cell count was inversely related to mortality, human immunodeficiency virus infection was linked to higher 30 days postoperative mortality (3.4% *vs.* 1.6%). Postoperative mortality rates among HIV-infected people receiving ART are low and are influenced by hypo albuminuria and age just as much as CD4 cell status [8].

AIDS and poor performance status are the two most important factors associated with poor surgical outcomes and wound healing (ASA score). Although both emergency and elective surgery have a high operative mortality rate in AIDS patients, patients who undergo elective procedures fare better than those who are operated on as an emergency [9].

During the perioperative period, adherence to antiretroviral therapy is critical, with lower levels of adherence linked to increases in viral load and drug resistance. This obviously has consequences for ART interruption caused by perioperative fasting. Fasting periods should be kept to a minimum [10].

One of the professional's primary responsibilities when an RVI patient arrives in the OR is infection prevention. However, studies have revealed that anesthetist's infection control practices are still insufficient [11,12]. Contamination of anesthetic equipment is a potential route for patient-to-patient transmission; therefore, disposable equipment should be used whenever possible. A study discovered concerning levels of contamination in laryngoscopes that were deemed safe for patient use [13].

Justification

One of the biggest health issues in the world today is HIV, and surgical and anesthesia exposure of HIV-infected patients is increasing. The perioperative management of this patient group is more difficult than that of HIV-uninfected patients. Because of the disease's involvement of organ systems, ART medication side effects, ART interaction with anesthesia medications, and HIV cross infection during the perioperative period; anesthesia management must be tailored to those specific issues.

Because there is no local guideline that addresses the issue, the patient is managed by routine anesthesia management, despite the fact that no local study on the postoperative outcome of this routine management has been conducted. An international study discovered a significant issue as a result of routine perioperative management of HIV/AIDS patients, which is drug interaction; immune compromise, delayed wound healing, drug resistance, increased viral load, and increased mortality.

Evidence suggests that patients with HIV experience high post-operative mortality rates, and those with AIDS are likely to experience even higher rates, and factors associated with this poor outcome are also mentioned in a number of studies, with some inter-study controversies, so we need to clearly demarcate when it is safe for HIV patients to have elective surgeries and what things need to be optimized in emergency procedures. Some scientific optimization methods for this group of patients are prohibitively expensive in low-income countries like ours, so we will develop a management algorithm for low-income settings based on evidence-based modifications.

Patient-to-patient and patient-to-physician HIV AIDS transmission, as well as breaching autonomy by disclosing the patient's HIV status to colleagues, remain opposing ideas, and there is no local working protocol that optimizes those ideas, which will be addressed by this evidence guideline.

Objectives

General objective: To develop a concise protocol on perioperative anesthesia management of patients with HIV AIDS.

Specific objectives

- To establish a preoperative optimization tool for preoperative HIV/AIDS patients.
- To develop guidelines for the intraoperative management of HIV/AIDS patients.

LITERATURE REVIEW

There are numerous ongoing controversies in the management of perioperative HIV/AIDS patients, which are addressed by new recommendations and updates. The process of developing evidence-based guidelines includes explicitly defining the question that the guideline or recommendation addresses. A comprehensive search for evidences was conducted after formulating eligibility criteria for the evidences to be included and selecting an appropriate search method. MEDLINE, PubMed, Google Scholar, Cochrane library to gather evidence, key words search (HIV AIDS, perioperative management, HAART, perioperative pain management, anesthesia pharmacology) were conducted.

Evidence was gathered, and quality was assessed using GCP appraisal checklists to classify them as level 1 (*Meta-analysis, systematic review, randomized control trial) or level 2 (**Well-designed cohort study). In-depth identification has resulted in a conclusion based on contradictory and contentious evidence.

By refocusing evaluation on the management of surgical HIV/AIDS patients, conclusions and recommendations have been drawn. The studies were summarized by weighing the benefits and drawbacks of various management strategies. Finally, a plan of action was developed. This research is registered on research registry.com with UIN of reviewregistry1470.

DISCUSSION

Preoperative evaluation

AIDS related conditions such as cardiomyopathy, pulmonary complications, peripheral neuropathy, medications, and bleeding episodes must be questioned about and recorded. Despite advances in HAART, routine laboratory evaluations such as complete blood count Hbg, platelet count, clotting

function evaluation, electrolytes, blood grouping, and renal and hepatic function tests should be performed [14].

An asymptomatic patient has no major anesthetic issues. In patients with advanced disease, however, cautious anesthetic management is required. A comprehensive preoperative evaluation of the patient's history, physical examination, and laboratory tests for HIV infection, organ involvement, and drug side effects is required [15].

Though evidences showed that low CD4 count and high viral load predicts significant postoperative morbidity and mortality, it's arguable when to postpone surgeries in this group of patients. Studies revealed that patients with low CD4 counts (under 200) or a viral load greater than 10,000 copies/ml were at a higher risk of complications [16,17].

Meta-analysis of 18 cohort studies done in Uganda showed that HIV infected individuals had an almost two-fold postoperative surgical site infection than non-infected. The study concludes that managing the HIV virus and achieving viral load suppression and elevated CD4 levels before surgery may be necessary in cases of elective surgery [18].

Patients with CD4 counts below 300 had a higher risk of developing postoperative infections, according to an RCT conducted in the USA. Additionally, they recommend that when considering surgery in this population, absolute rather than relative operative indications should be used. But more research is required to determine whether preoperative interventions could help this particular patient population have lower postoperative infection rates [19].

A meta-analysis of 16 RCTs done in China showed that preoperative immune support reduces postoperative infection rate but not postoperative mortality for gastro intestinal surgeries [20].

Anesthesia management

To prevent the emergence of viral strains that are resistant to highly active antiretroviral therapy, it is necessary to continue treatment throughout the perioperative period. Zidovudine through an NG tube may be administered to patients who are extremely infected if highly active antiretroviral therapy is held and parenteral alternatives for antimicrobial prophylaxis are not tolerated by the patient after the procedure [21].

Regarding the preference of anesthesia technique, in case of general anesthesia its interaction with ART drugs and systemic disease caused by HIV needs to be considered. In regional anesthesia as well local infections, coagulopathy and neuropathies sick's a great deal of attention [22].

There is no proof that central neuraxial blockade hastens the progression of HIV, nor is HIV infection a strict no-no for regional anesthesia. On the other hand, regional anesthesia may be harmful if there are HIV complications: To document any neurological deficiencies, it is crucial to perform a thorough preoperative neurological examination [23].

Anesthesia related complications are less frequent in local and regional anesthesia than in general anesthesia, and there were no special anesthesia-related complications in HIV patients undergoing regional anesthesia.

Perioperative considerations for patients who are going to use HAART

The use of ART should be continued during the perioperative period, particularly in patients with a high viral load. With parenteral drug formulations of zidovudine and enfuvirtide or *via* an NG tube, ART may minimize viral load during the perioperative time, improving the safety of the procedure and lowering the incidence of operative complications in HIV/AIDS patients.

The literature states that patients with HIV/AIDS who have virology suppression and no drug resistance should continue their current ART regimen during the perioperative period, but patients with high viral loads should have their ART regimen improved with second-line medications like a protease inhibitor or a fusion inhibitor [24].

Regarding the interaction of ART and anesthetic drugs. Is cytochrome P450 inhibitors. Cytochrome P450 is involved in the metabolism of several anesthetic and analgesic agents, and its inhibition results in prolonged neuromuscular blockade after vecuronium reduces fentanyl clearance and increases fentanyl half-life [25].

Ritonavir reduced fentanyl clearance by 67% and can significantly inhibit metabolism, so caution should be exercised if fentanyl is given to the patients receiving ritonavir medication. It is best to keep respiratory monitoring going for as long as possible and fentanyl dosage should be reduced with more continuous dosing.

Protease inhibitor therapy should be carefully considered, according to a clinical review done in Valencia, Spain, because of the relative risk of overdosing on opioids, non-steroidal anti-inflammatory drugs, and benzodiazepines.

Perioperative pain management in HIV infected patients

It is advised that the WHO guidelines for cancer pain be followed when treating pain in the RVI population.

According to review released by American psychiatric association, pain management in HIV patients can be better managed by The World Health Organizations pain management ladder [26].

Blood transfusion for HIV AIDS patients

Transfusion has been used in clinical practice for more than a half-century, but due to emerging risks associated with transfusion, particularly in critical patients, such as HIV/AIDS, evidence is being generated to answer controversial questions about it, according to one study, perioperative blood transfusions increased the risk of immune compromise and mortality after surgery.

It was not possible to determine the clinical significance of a small increase in viral load among HIV-infected patients who received transfusions.

A clinical review from South Africa stated that the idea of, HIV patient don't require rapid correction of anemia is a popular misconception. Similar to HIV-negative patients, HIV-positive patients with acute hemorrhage may need resuscitation and a quick transfusion.

With the lower studied restrictive hemoglobin threshold of 7 g/dl, a meta-analysis of 8 RCTs conducted in China revealed that a restricted transfusion approach reduced infections in orthopedic patients much more than a more liberal strategy [27].

Perioperative care to prevent cross infection

The disclosure of the patient's sero-status to the OR team may result in social stigmatization of the patient, necessitating a balancing of the rights of suspected or actual HIV-infected individuals with the preferences of patients, customers, coworkers, and others. The anesthesiologist and operating room personnel must respect and protect the patient's confidentiality.

Airway devices are really not shared between patients due to the risk of HIV transmission from contaminated anesthetic equipment, contaminated laryngoscope handle and blade needs to be disinfected before reuse; to prevent breathing system contamination, heat and moisture-exchange filters that effectively filter bacteria and viruses should be used. Use of a disposable respiratory circuit is absolutely essential if a hydrophobic filter is not used with each and every patient. The use of a single syringe with anesthetic drugs for different patients is not an acceptable practice [28].

Another issue is the possibility of HIV transmission from an infected patient to a care provider after contact with infected bodily fluids. Double gloves should always be worn during surgical procedures due to the significantly higher level of protection they offer. It is advised to start post exposure prophylaxis as soon as possible after the injury, ideally within 1 hour-2 hours [29].

By their infection transmission capacity operation room instruments classified in to four groups, critical items, semi critical items, non-critical items and environmental surfaces. The method of decontamination for each classification is different critical items should be sterilized before reuse, high-level disinfection is acceptable for semi critical items, cleaning and subjected intermediate or low-level disinfection is possible for non-critical items, and for environmental surfaces, intermediate or low level disinfection is a suitable mode of decontamination.

A study demonstrates that the anesthesia machine is a potential source of microbes that contributes to healthcare associated infections, and this disposable, affordable, non-permeable, transparent anesthesia machine wrap has a protective effect during routine anesthetic care, offering a dependable and affordable method to reduce pathogen transmission among patients and potentially lower healthcare associated infections [30].

Areas of controversies

Multisystem effect of HIV AIDS and HAART makes the effect of anesthesia and surgery unpredictable, some non-routine investigations are required in this group of patients, though the list of investigations is not yet clearly stated. In all HIV-infected patients, a thorough pre-anesthetic evaluation should be supplemented with laboratory data.

Despite the lack of a clear demarcation on the fitness of those patients for anesthesia and surgery, the preoperative assessment and evaluation is focused on the systemic effect of HIV AIDS and HAART and its impact on anesthesia management [31].

There is anesthesia drug selection for patients with anesthesia, and there have been some controversies about which drug are better to use, to be used with caution, and to be avoided.

The number, type, and use of highly active antiretroviral therapy has increased over time, exposing perioperative HIV AIDS patients to drug-to-drug interactions; however, pharmacodynamics interactions can be avoided by selecting anesthetic agents with minimal effects on the hepatic or renal systems.

There is no clearly defined guideline for the disclosure of a patient's HIV status, his right to autonomy and confidentiality, and infection prevention from patient to patient, patient to staff, and staff to patient.

Prior to surgery, anesthetists should conduct a physical examination, a thorough medical history, and laboratory tests to evaluate the patient's general health. In order to accurately estimate the perioperative risk of an HIV-patient undergoing surgery, preoperative risk assessment should focus on the patient's status, the type of surgery, and anesthesia, as well as the centers for disease control stage of HIV infection, immunologic status ($CD4^+$ cell count), and any existing opportunistic infection and malignancy.

Although general anesthesia is thought to be safe, it is still advisable to think about drug interactions and how they may affect different organ systems before surgery. The preferred method is frequently regional anesthesia. However, it is important to take into account the possibility of neuropathies, local infections, or abnormalities in blood clotting.

Anesthesia drug handling

Most antiretroviral medications used to treat HIV/AIDS have side effects that interfere with anesthetic drugs. A non-nucleoside reverse transcriptase inhibitor called nevirapine activates the cytochrome p450 enzyme and may lower the levels of anesthetics and sedatives in the blood.

Protease inhibitors are broken down by the cytochrome p450 isoenzyme p3a4. They actively compete with the enzyme to inhibit it, which may enhance the effects of drugs that are metabolized by cytochrome p450.

The Y circuit should routinely contain PALL BB22-15MS filters if there is obvious lung pathology, and if there is no filter, the circuit should be discarded after use.

Patients with a viral load greater than 10,000 and a CD4 count of 200 should receive zidovudine IV intraoperatively, or with an NG tube if an IV drug is not available, to prevent immune suppression and drug adaptation.

Perioperative blood transfusion increases the viral load of the patient; therefore, restrictive blood transfusion is recommended.

All health care workers who will have contact with the individual must be aware that the client is seropositive, though confidentiality must be maintained.

(WHO) analgesic ladder for cancer and RVI patients is recommended to use with great caution for NSAID as they may worsen the situation in chronic usage.

CONCLUSION

HIV/AIDS is a systemic disease that affects the majority of human body systems, such as perioperative anesthesia management, perioperative morbidity, and mortality rate. Consequently, this patient group must be closely monitored using the critical management techniques outlined in this and related papers.

ETHICAL APPROVAL

Not required.

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AUTHORS' CONTRIBUTIONS

Each author has contributed to the phases of this evidence-based guideline's development, presentation, and implementation. All authors, in particular, evaluate literature critically and present their findings to their peers for debate. They have taken part in identifying needy areas during the postoperative period in order to generate the right recommendations.

CONFLICT OF INTEREST'S STATEMENT

There is no conflict of interest.

RESEARCH REGISTRATION

This research is registered on research registry.com with UIN of reviewregistry1470.

AVAILABILITY OF DATA AND MATERIAL

This is not applicable because it is a review of papers.

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FLOW DIAGRAM

Preperative optimization flow chart.

Intraoperative optimization flow chart.

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